Machines General 45

ILLUSTRATED CATALOGUE

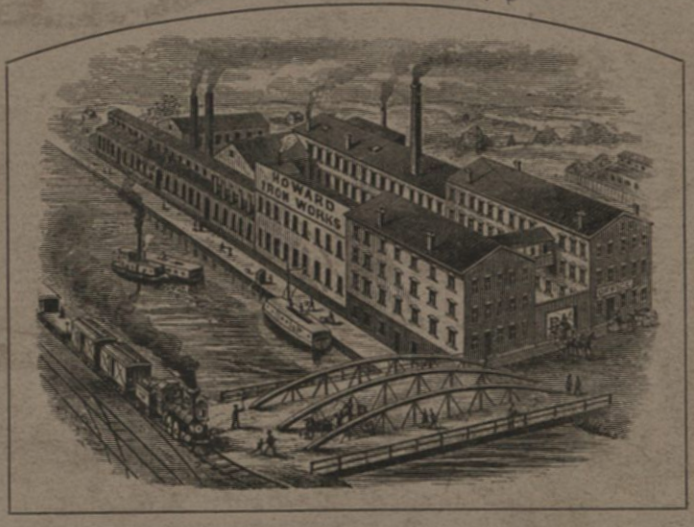
AND

REDUCED PRICE LIST

OF

GOODS

43,140.



MANUFACTURED BY THE

Howard Iron Works

RUFUS L. HOWARD.

BUFFALO, N. Y.

1876.

SUBJECT TO CHANGE WITHOUT NOTICE.

Haas, Nauert & Co., Printers and Binders, 200 Main St., Buffalo N. Y.

THE

Howard Iron Works

RUFUS L. HOWARD.

BUFFALO, N. Y.

MANUFACTURERS OF PATENTED

Printers', Book Binders' and Paper Box Makers'

MACHINERY

IN LARGE VARIETY.

POWER AND HAND ELEVATORS,

SCHLENKER'S

STATIONARY-DIE BOLT CUTTER

SCHLENKER'S AUTOMATIC

REVOLVING-DIE BOLT CUTTER

AND NUT-TAPPING MACHINE,

HOWARD PARALLEL BENCH VISE,

HOWARD COACH MAKERS' VISE,

STEEL AND IRON SET-SCREWS,

HERCULES SCREW PROPELLER WHEELS,

TAPS AND DIES,

BELL BOTTOM JACK SCREWS,

CENTERING LATHES, LAWN SEATS,

GRINDSTONE FRAMES, CAST IRON SINKS,

RAIL ROAD SUPPLIES,

SHAFTING, HANGERS, PULLEYS, BARK MILLS, WESTON'S BALANCE CRANK LEATHER ROLLER, CONVEYERS, AND OTHER TANNERY FIXTURES, CASTINGS, AND ALL IRON WORK AS ORDERED.

PREFACE.

In presenting our new Price List Catalogue to the public, it is our desire to furnish information in regard to the goods manufactured by us, that shall result in the mutual benefit of our patrons and ourselves. Since issuing our last Catalogue, we have made such changes in the construction of our different Machines, as would, in our judgment, add to their *efficiency* and *strength;* our endeavor being not so much to reduce the cost of manufacture, as to furnish the best machine in the market at a reasonable price to the purchaser. We have spared no expense in improving the design, and perfecting the working parts of all the goods we manufacture. The material is selected from the best in market, and the workmanship is unsurpassed. We sell all our goods on their *merits*, and allow no imperfect castings or machines to be sent from our Works. All of our goods, as at present manufactured, are the result of *long experience*, *careful investigation*, and a *thorough knowledge* of what each article is intended to accomplish. We offer them to the public in the firm belief, that none will be found to excel them in *finish*, *power*, and *durability*. We have been cautious in stating the capacity, and describing the construction of our machinery, not to *over-estimate* their efficiency; preferring rather that when put to a working test, they should be able to accomplish more than we claim for them. Many of our Tools have been in use for years in this country, and the Provinces, and amongst our references will be found the names of some of the most prominent business men, and the largest manufacturers.

Book Binders', Printers', and Paper Box Makers' Machinery is now an important branch of our business; one department in our Works being devoted exclusively to the manufacture of these goods in large variety. Our patterns comprise machines of the latest design, with all the recent improvements for *rapid* and *accurate* work, which are illustrated in our Catalogue of Book Binders' Machinery. We shall be pleased to mail our Catalogue of such goods, and give any information desired, on application of interested parties. We also give prompt attention to repairs, and furnishing duplicate parts for the above class of goods.

Our Power and Hand Elevators, with our recent improvements to secure safety as well as speed in elevating goods, are justly regarded as the most complete machines for the purpose in the market. A thorough investigation will well repay the purchaser for the time and trouble.

Our Bolt Cutting Machinery comprises a larger variety of styles and sizes than can be found at any other establishment. In addition to our Stationary-Die Machines, which have been so favorably received by the trade, we are now manufacturing several sizes of the celebrated Schlenker Automatic Revolving-Die Bolt Cutting and Nut-Tapping Machines, which are not equalled by any of the many recent inventions for the same purposes. Each size possesses some *peculiarity* of construction, adapting it to *special* as well as general work; and we would direct especial attention to our cuts and description of these Tools.

Propeller Wheels have recently been added to our list of goods, and we offer to the Marine Interest our Hercules Screw Propeller, as producing more power under same pressure of steam than any Screw of same size and lead. A full description of its construction and superiority will be found under the cut illustrating the same.

In our list of Tanners' Machinery is included a complete outfit for the largest establishments. The variety of styles and construction

exclude us from giving cuts. We are, however, prepared to furnish without delay, the *latest* and *most improved* machinery for conducting the Tannery business in all its branches.

The Howard Vise, which is now in such general use throughout the country, has, since the issue of our last Catalogue, been *much improved,* both in design and construction. We have added many new sizes to our former patterns, and now keep in stock a variety of styles suited to light and heavy work.

Our facilities for furnishing manufacturing establishments with complete outfits of Shafting, Pulleys, and Hangers, of the latest and most improved patterns, are excelled by none. We have machinery *especially adapted* to this kind of work, and complete sets of patterns for all sizes of light and heavy Pulleys and Gearing. We cheerfully furnish estimates on large or small contracts, giving parties the satisfaction of knowing what their work will cost before ordering the same.

We have in connection with our Machinery Department one of the largest and most complete Iron Foundries in this section, and are prepared to furnish, on short notice, and at special rates, all light and heavy castings. We make a *specialty* of *heavy castings* for Rolling Mills, Furnaces, and Forges, and also give particular attention to every variety of Rail Road Work.

In our list of Miscellaneous Goods will be found many articles, adapted particularly to the Hardware Trade, the quality of which we guarantee as represented. In design and finish, they will compare favorably with other goods in the market of same grade. We invite a careful inspection of the merits of our machines, and other manufactured articles, and a comparison of prices, feeling confident that we can offer as great inducements to purchasers as any house in our line of goods.

POWER AND HAND ELEVATORS.

The Howard Gear Power Elevator, manufactured by us, has an internal gear, and a *perfect safety attachment*, so arranged as to avoid any possibility of accident. It is simple in its construction, and any one can operate it. For cheapness, great economy, the *saving of labor*, and the *speed of elevating* goods, it is unequaled in the market.

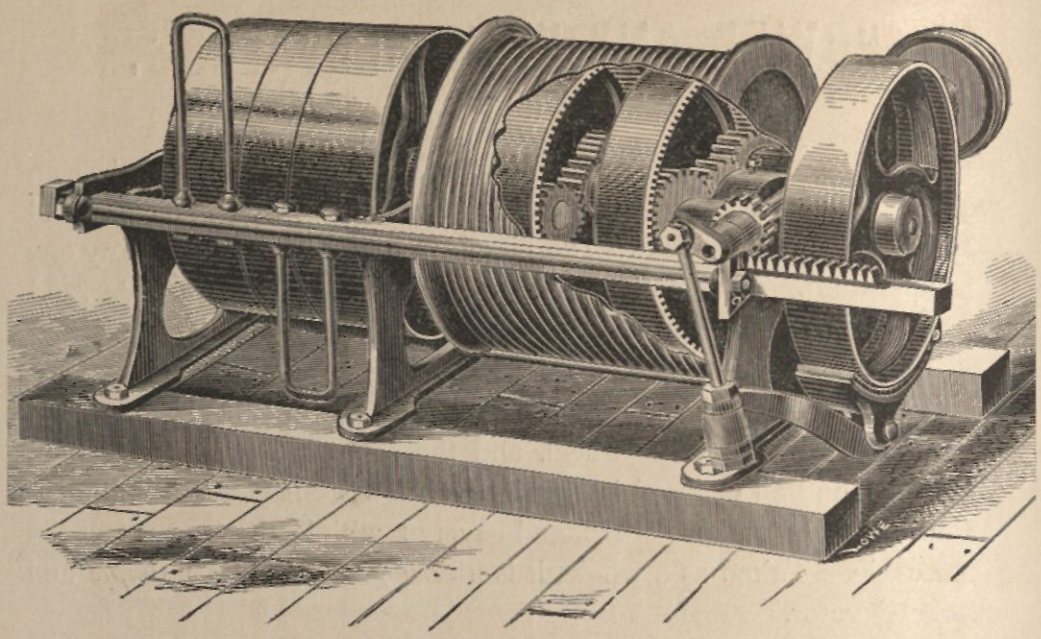
The Howard Screw Elevators are made so as to secure the least possible wear, as well as perfect safety. The Worm Wheel is cast upon a chill, the same as a car wheel, and the screw is made of steel and hardened, and all inclosed in cast-iron oil-tight casings. The Winding Drum is made of hard wood, and covered with leather to protect the wire cable. Taken as a whole, it is a *very perfect, durable, simple* and *cheap* Elevator.

All of our power machines are made with Olmsted's Patented Lubricating method, of which we are sole owners for Elevators. This invention consists in using a hollow steel shaft with apertures open from the interior to the exterior at the places where the loose pulleys revolve, and where the boxes are placed for the shaft to revolve in; which apertures are closed with leather through which the oil, which is placed inside the shaft, penetrates sufficiently to keep the bearings lubricated. This principle of lubricating has been applied to nearly all kinds of machinery, and has proved perfectly reliable in all cases, including Woodworth's Planers, Saw Mandrels, Fan Blowers, Eccentrics, Crank Pins, Cross Heads, and Shafts for Steam Engines.

We, and many others, consider this method the only safe and reliable lubricator for loose pulleys.

The Hand Elevators of our manufacture, are a handsome addition to fine finished buildings, and are adapted for general merchandise. The machines are so arranged that they can be *checked, made fast*, or *loose*, at any *desired place;* they are entirely at the will of the operator, and will be found equal to any Hand Elevators in use. Being simple and perfect in construction, they are not liable to get out of order.

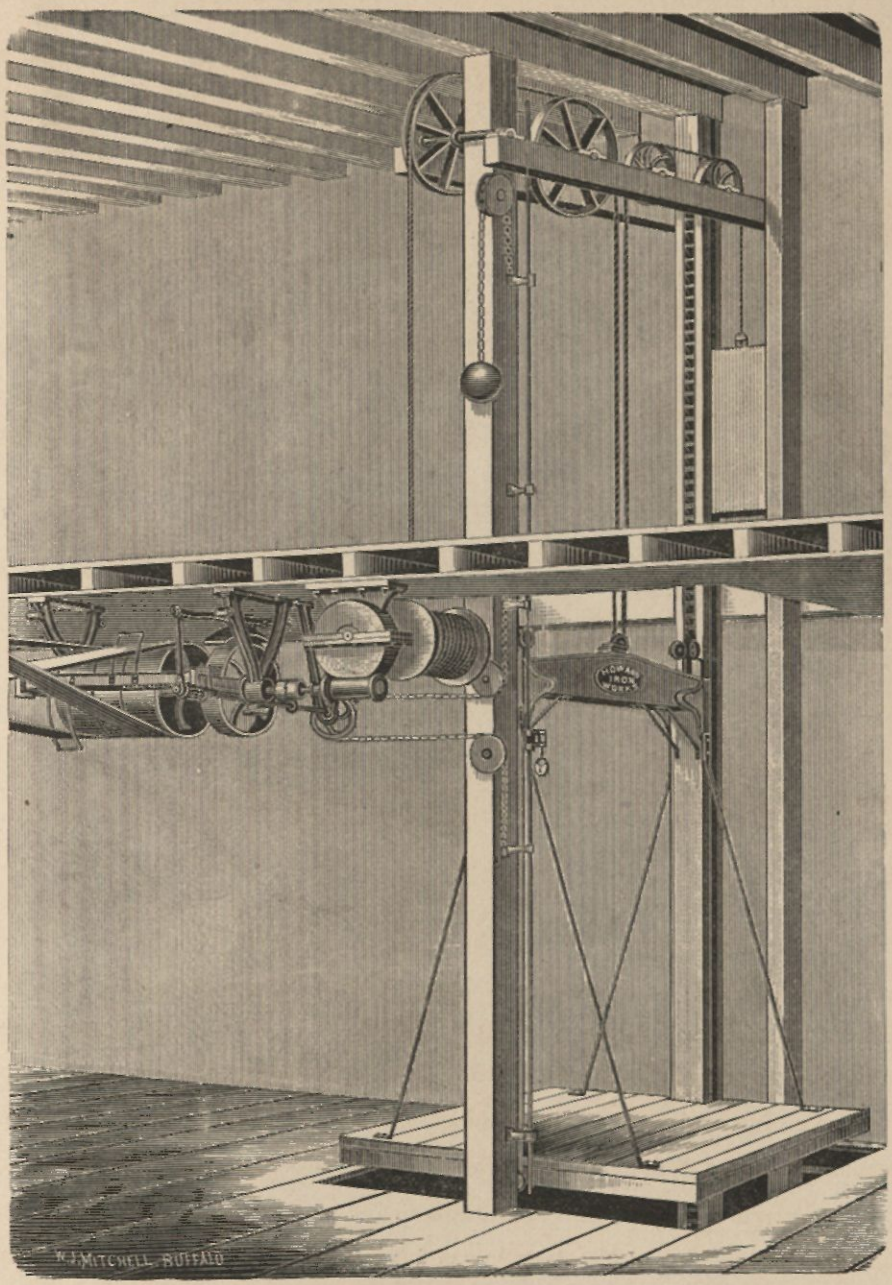
All of our Hand Elevators are provided with patent *anti-friction rollers, cast-steel gearing*, two wire lifting ropes, counter-weight, *screw* and *self-acting brake,* and wrought iron rope wheel.



E. Schlenker's Patent.

CUT SHOWING INTERNAL GEAR

We desire to call the attention of parties interested in elevators, to the above cut, showing the construction of our Power Gear. It has many improvements over other machines in the market, which merit a careful inspection from buyers before deciding what machine to purchase. It will be observed that all the gearing is inclosed in the Drum, which *effectually protects* the parts from all *dust* and *grit;* it also prevents the cable from being *drawn into the gearing*, which would cause serious damage to both. Another important feature of our machine, which is covered by our patents, is the *disconnecting of the cable from the Drum* in case of accident. Should the Platform meet with any obstruction in the descent, the cable unwinds and is detached from the Drum, *without doing any damage;* but when the cable is not so arranged, the result is usually disastrous, the rope either being drawn into the gearing, or winding up with the Lowering Belt, causing a serious accident when the Platform meets with obstructions above. This *cannot occur* with any of our machines. The oiling of our gearing is all done through the hollow steel shaft, and the machine works equally well, when suspended from the ceiling, attached to the wall, or fastened to the floor.

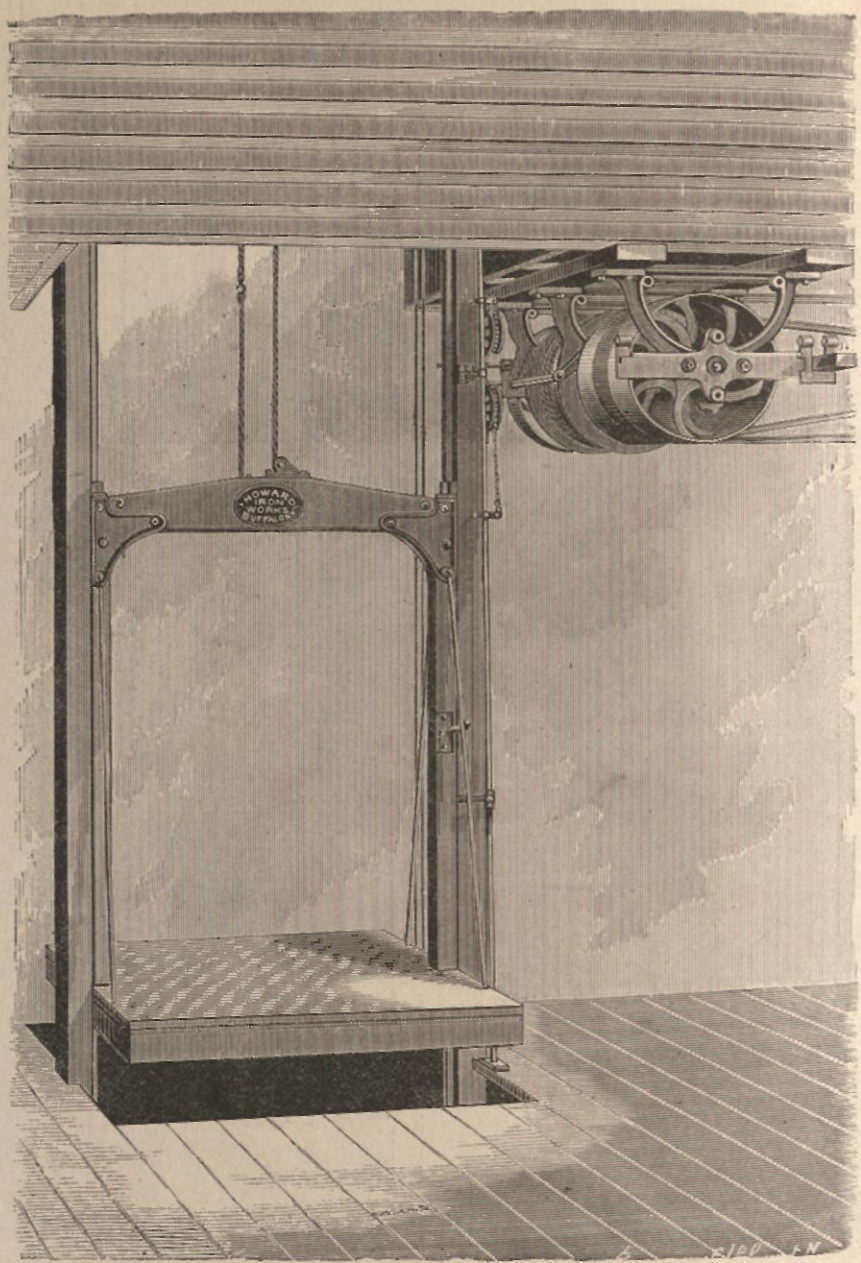


E. Schlenker's Patent.

HOWARD SCREW ELEVATOR,

WITH SAFETY ATTACHMENT.

The above cut illustrates our Screw Elevator with capacity of 1000 pounds. It gives *perfect satisfaction* on light weights, but is not intended for lifting heavy loads; in all such cases we recommend our Power Gear as being much faster and stronger.

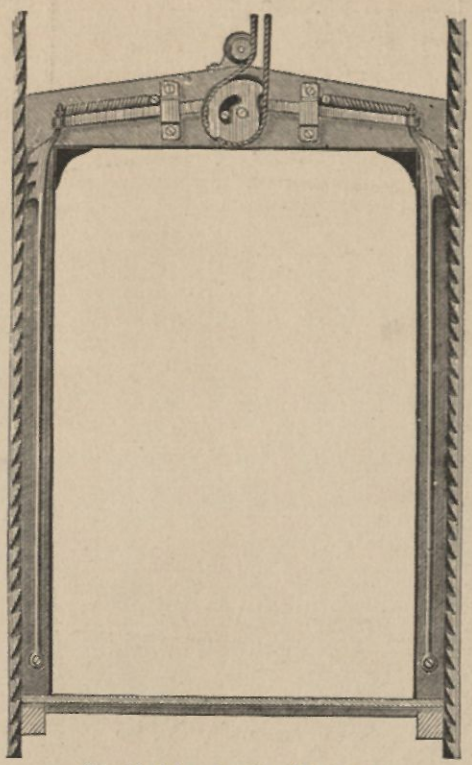


E. Schlenker's Patent.

HOWARD GEAR ELEVATOR,

WITH SAFETY ATTACHMENT.

The above is a cut of our Power Elevator with capacity of 3,000 pounds. The Gearing, as shown in the cut, is suspended from the ceiling, but it can be placed in *any position* circumstances may require. Our Elevators are all constructed with a *self-stop* for each story, which always brings the Platform on a *level with the floor*, and obviates the difficulty of stopping at the right point by hand.



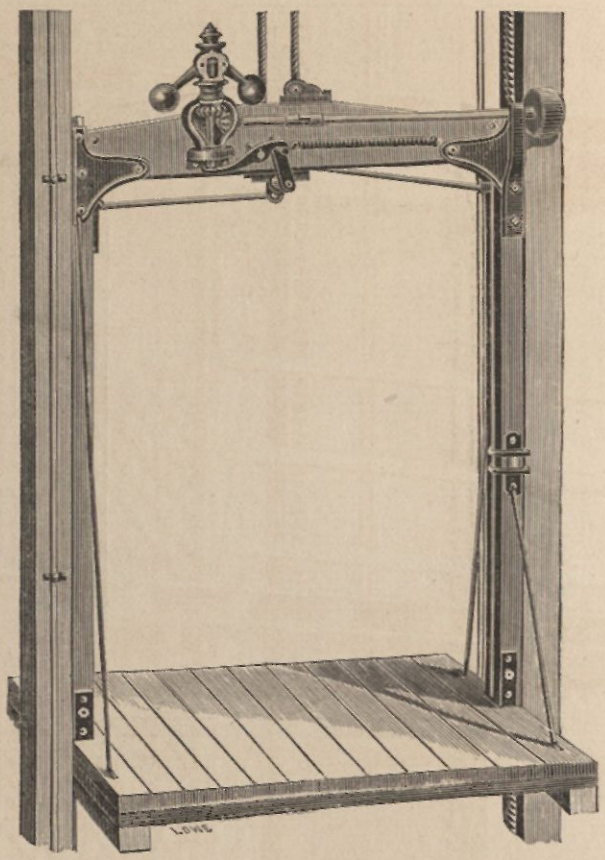
E. Schlenker's Patent.

Cut Showing CAM and Operation of the

SAFETY ATTACHMENT.

The above cut shows the machinery for working our Safety Attachment. It is entirely different from anything in use by other manufacturers, and has *never failed* to operate successfully, although it has been put to the *severest tests* during the past six years. We do not depend upon the *unsafe working of springs* to force our Ratchets together, as some of the most serious accidents that have occured with Elevators have resulted from the *failure of springs* that were apparently in good condition. In case the Lifting Rope should break, the weight of the Platform and its contents *instantly* forces the Ratchets firmly together, with *no possibility* of a failure to stop the descent of the Platform.

The springs that appear in the cut are used only for the purpose of withdrawing the Ratchets when the weight has been removed from the Cam. The Ratchets are made of wrought iron, extending to the bottom of the Platform, and are secured in the *strongest manner possible.* No device or expense should be spared to increase the safety of Elevators; and we would direct your attention to the cut, and explanation of our Safety Governor, which appears on the next page.



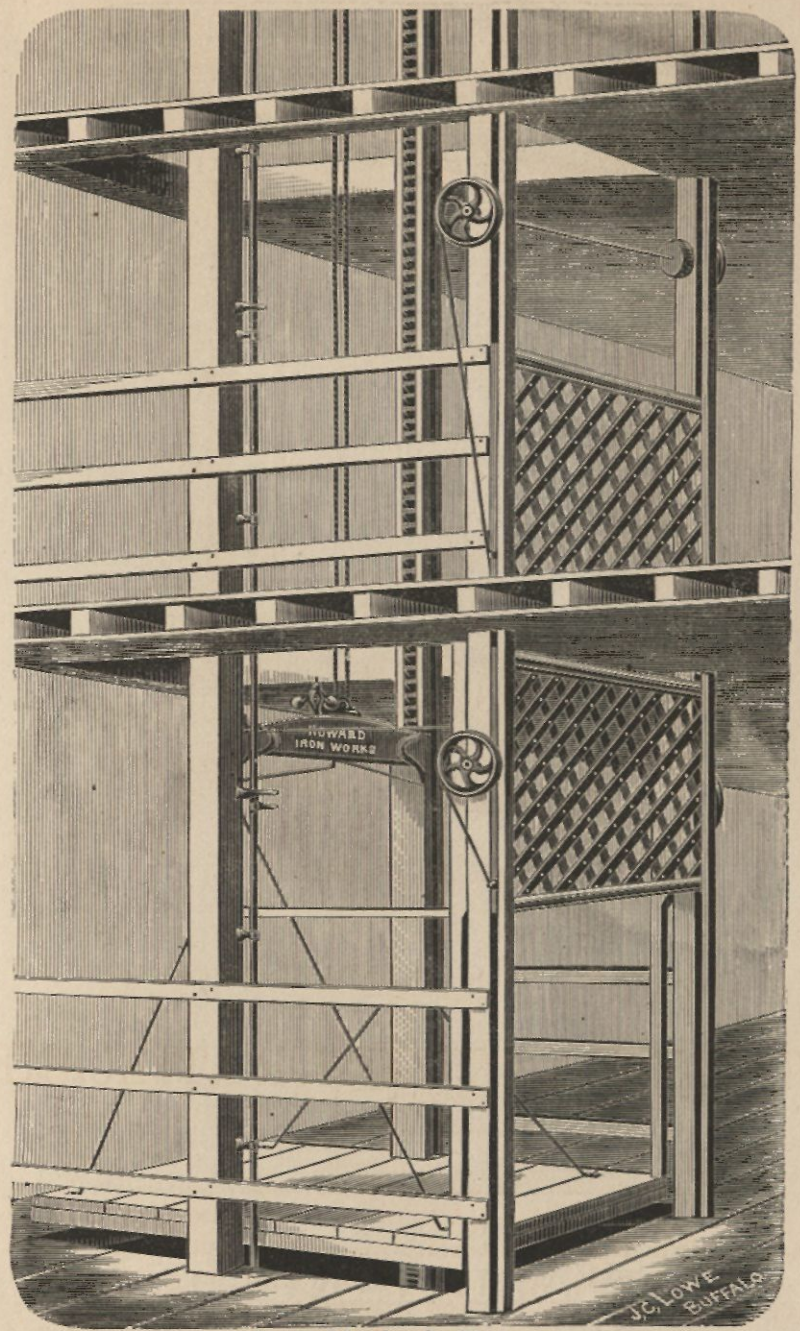
E. Schlenker's Patent.

CUT SHOWING

PLATFORM WITH GOVERNOR ATTACHMENT

Our Safety Governor is of recent invention, *complete* in all its parts, and is operated independently of the Safety Attachment. We regard it as a very *important feature,* and no Passenger Elevator should be used without one being attached. It is operated as shown in the cut, by a rubber pulley pressed firmly against the upright-ways, so that the motion of the Platform in rising or descending, causes the balls to revolve. An increase of speed raises the balls and presses on the lever below, which operates the Safety Ratchets, and *immediately stops* and *holds* the Platform.

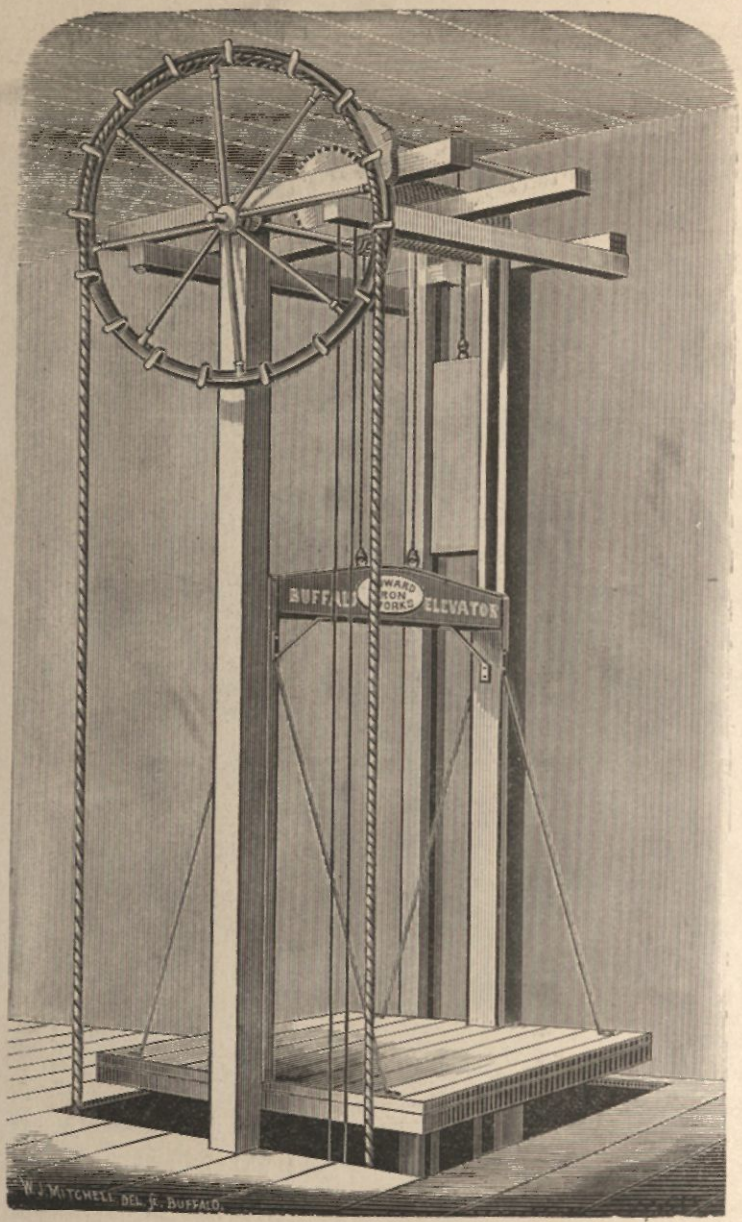
It is a *sure protection* against the too rapid descent of the Platform in any contingency that may occur; the importance of which can not be *over-estimated.* It would be found *invaluable* should the driving belt break or become detached from the pulley; and in case of a breakage in the gearing, or a suspension of the motive power with a heavy load, the Governor would *instantly stop the descent* of the Platform. An increase of ten (10) feet per minute over the usual speed of the Platform will operate the Governor and *effectually* check the motion, either in *ascending* or *descending.*



E. Schlenker's Patent.

AUTOMATIC HATCHWAY GATE.

The above cut represents our Hatchway Gates for Power Elevators, and is a very simple and effectual device to prevent accidents by *falling through the Hatchways.* The Gates are operated by the motion of the platform in ascending and descending, and are *always closed except when the Platform is on a level with the floor.* These Gates can be attached to any Power Elevator.



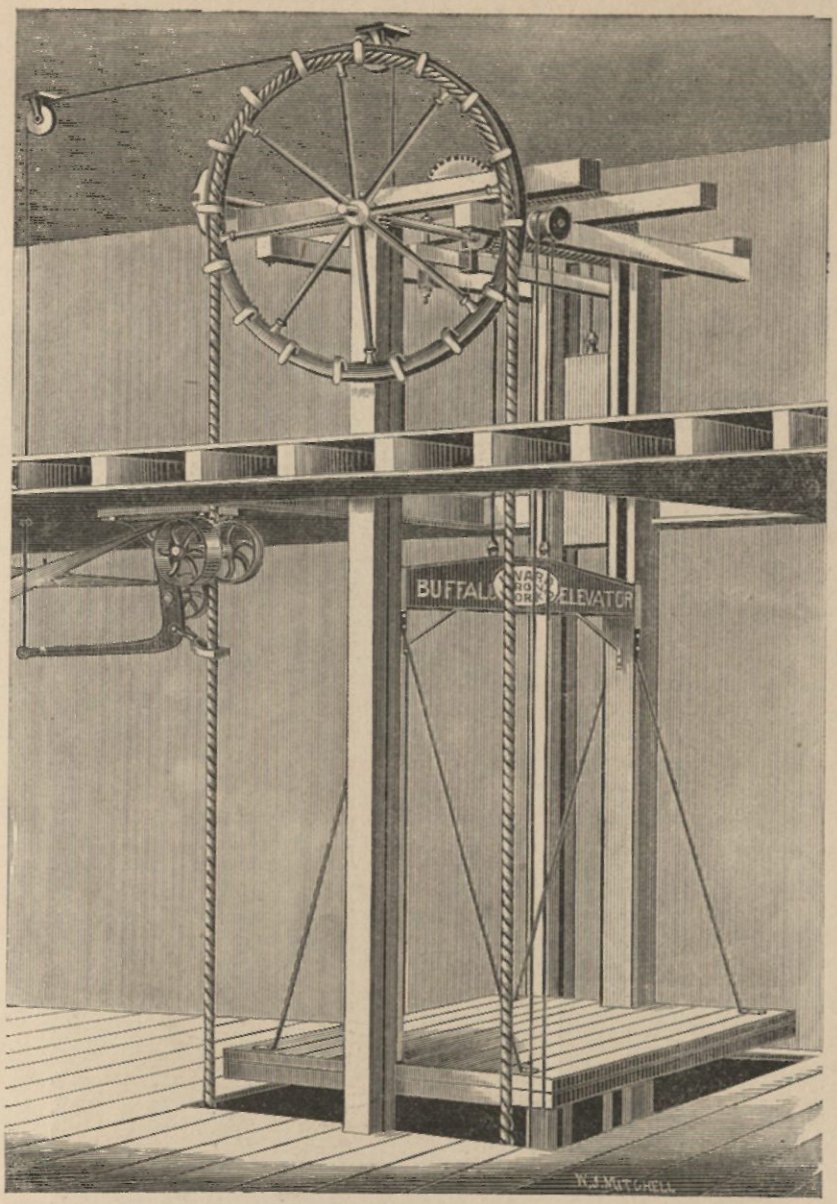
E. Schlenker's Patent.

No. 3, HOWARD HAND ELEVATOR.

Capacity, 3,000 Lbs.

Cast-steel Gearing, two wire Lifting Ropes, anti-friction Rollers, Counter-weight, Screw and Self-acting Brake, wrought iron Rope Wheel.

This machine possesses the merit of cheapness, simplicity of construction, strength, and durability, to a greater extent perhaps than any competitor. Our endeavor being to make the machine as safe as possible (without having our Safety Attachment), we use steel Gearing, two wire Cables for lifting, and construct the Platform in the most substantial manner, with strong iron bolts and rods for braces and supports at every available point. This machine is largely in use, and is regarded with especial favor as a Hand Elevator.



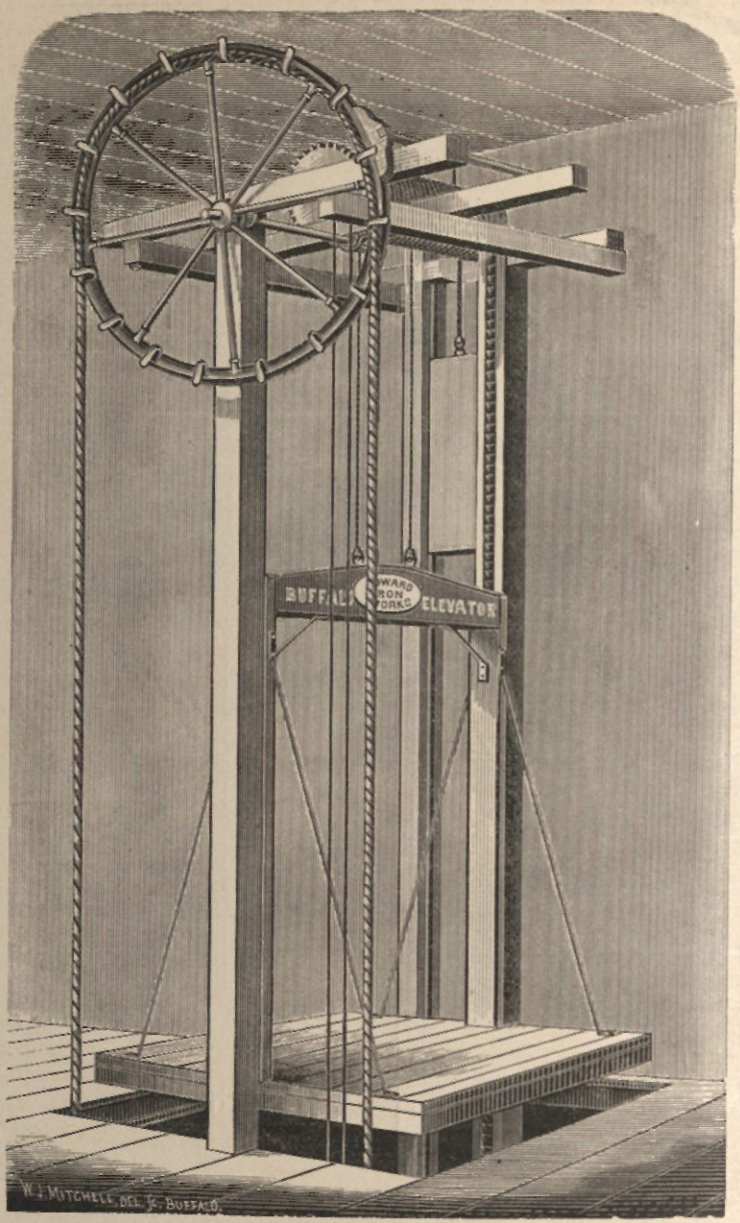
E. Schlenker's Patent.

No. 4, HOWARD HAND ELEVATOR,

With Anti-friction Rollers, two Wire Lifting Ropes, Cast-steel Gearing, and Power Jack Attachment.

This machine is the same as No. 3, with Power Jack Attachment.

This Jack can be successfully used for ordinary work, where belt power can be had, lifting from 600 to 1,000 lbs. Price same as No. 3, with $50.00 added for the Jack.



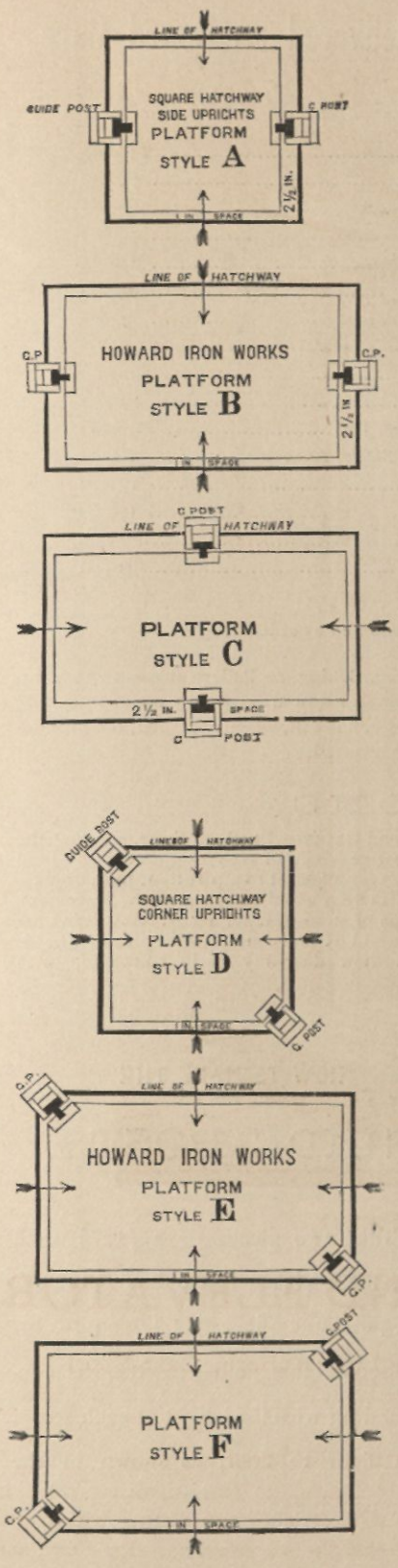
E. Schlenker's Patent.

No. 5, HOWARD HAND ELEVATOR,

With Safety Attachment, Anti-friction Rollers, Cast-Steel Gearing.

This machine has the full Safety Ratchet, same as the Power Elevator.

Price in Buffalo, without upright ways, not to exceed 40 feet, $400.00; over 40 feet, $4.00 per foot added. With upright ways, 40 feet, and putting up within the city limits, $450.00. Putting up outside the city,—freight on machine, men's fare and board to be paid by purchaser.



IN the erection of the Howard Elevator, there are five questions to be decided before proceeding with the work, to wit:

FIRST.—In which angles, or at which side of the Hatchway to place the Guide Posts.

SECOND.—Where to place, and how to attach the Shifter or Hand and Check Rope, or Rod.

THIRD—Where to place and locate the Machine or Lifting Rope and Belts, so as to be in their proper place.

FOURTH.—Where to place the Counter-weight.

FIFTH.—Where to place, and how to secure the large Sheaves for lifting and Counter-weight Rope.

Each of these points should be carefully considered in its order, but not determined without reference to the others, as the necessities to either may require that the others be adjusted accordingly Upon the consistent location and proper erection of all the various parts depends, in a great measure, the usefulness and perfect action of the machine.

POSITION OF GUIDE POSTS.

The position of the Guide Posts must be governed chiefly by the consideration of convenience in conveying goods to and from the Platform at the various floors. As a general rule, if the goods to be hoisted or lowered, can, at all the different floors, be handled directly across the Platform, or from one side only, the Guide Posts may be placed on two of the sides of the Hatchway not required to be used in handling the goods.

STYLE OF PLATFORM.

The Platform in this case will be constructed with side uprights, and is called the "Side Platform"—See Cuts marked A B C. But if it is found necessary to convey the goods to and from the Platform at all sides, or at three sides, or at any two sides at right angles, the Guide Posts should be placed in the angles or corners of the Hatchways, and the Platform will be constructed with corner uprights, and is termed the "Corner Platform"—See Cuts marked D E F. When all four sides are to be used, the Counter-weight can be carried off to some convenient place.

RELATIVE POSITION OF HAND CHAIN, OR ROD, AND GUIDE POSTS.

In determining the position of the Guide Posts, a due consideration should be given to the position of the Hand Chain, or Rod, for operating the machine, and if, as is often the case, it is found there is but one suitable place in the Hatchway for it, one of the Guide Posts should be placed near that point, if it can be done without otherwise impairing the perfection of the machine.

In ordering any of these Elevators, please designate the style of Platform best suited to the location by the letter on the Cut.

Prices of Elevators in Buffalo, or delivered on Board Cars.

See cuts of machines in explanation.

1,000 pound Power Elevator, (Screw)	$450.00
2,000 pound Power Elevator, (Gear)	550.00
3,000 pound Power Elevator, (Gear)	650.00
4,000 pound Power Elevator, (Gear)	750.00
5,000 pound Power Elevator, (Gear)	850 00
6,000 pound Power Elevator, (Gear)	950.00
Extra Safety Governor	75.00
No. 1, Hand Hoist, (no Platform)	95.00
No. 2, Hand Elevator, with Platform	160 00
No. 3, Hand Elevator, with Platform	275 00
No. 4, Hand Elevator, with Platform, including Power Jack	325.00
No. 5, Hand Elevator, with Platform, including full Safety Attachment	400 00
No. 6, Sidewalk Elevator	150.00
No. 7, Barn Hoist for Carriages	175.00
Automatic Hatchway Gates, (each)	15 00
Apparatus on Platform to operate Gates	10.00

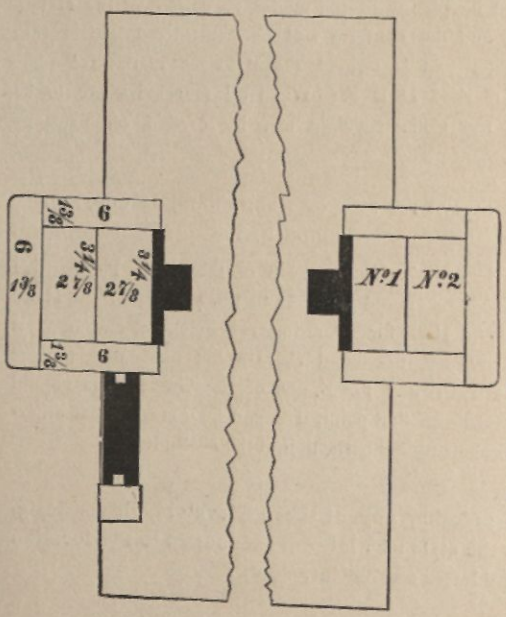
The above prices are based on an elevation of 40 feet.

Fine lead Charcoal and Steel Wire Rope for Elevators furnished as ordered.

In the above List of Prices we do not include any Shafting, Belting, or Pulleys, necessary in transmitting power to the Elevator, nor any timber work and materials required in putting up, and securing same in building. We do not undertake to erect at our expense, but will, when requested, send a competent mechanic, charging the parties with the actual expense incurred.

DIRECTIONS.

When ordering any of these Platform Machines, please send GROUND PLAN of Store, showing the location of Hatchway, etc.—a rough sketch will suffice. Also give height of each respective floor—from floor to floor. If the opening is situated in a corner of the Store, or adjacent to a partition, post, or other object, please give distance from Hatch-trimmer to same, and thereby avoid any consequent miscalculation. Send PLUMB LINE size of opening. Write on the sketch of store—FRONT OF STORE; REAR OF STORE. Do not use North, South, East or West Side,—Front and Rear is more intelligible to us. If an Alley-way to side or rear of store mention it, and show door-way as in connection with Hatchway, etc.



HOW TO MAKE THE

GUIDE POSTS.

Take two pieces of 3¼x2⅞ inch pine, three pieces 1⅜x6 inch pine for each post, one piece 3x3 inch pine for Counter-weights guide, in lengths corresponding with the height of each story, from floor to floor, as shown in the accompanying cut.

The following parties are using our Power Elevators, to whom we are permitted to refer:—

Courier Company,	Buffalo, N. Y.,	2	in use.	Weller, Brown & Mesmer,	Buffalo, N. Y.,	1	in use.
Pratt & Letchworth,	" "	3	"	Bush & Howard,	" "	1	"
Christian Kurtzmann,	" "	1	"	Geo. Mugridge & Son,	" "	1	"
T. Hersee & Co.,	" "	1	"	Henry Lampert,	Rochester, N. Y.,	8	"
John T. Noye & Son,	" "	2	"	Lowery & Bradner,	" "	1	"
Dr. R. V. Pierce,	" "	1	"	Schantz, Minges, Shale & Co.,	" "	1	"
Hart, Ball & Hart,	" "	1	"	Sibley, Lindsley & Curr,	" "	1	"
Fox & Williams, Sugar Works,	" "	1	"	J. T. Stewart & Son,	" "	3	"
Frank & Co.,	" "	1	"	James Cunningham & Son,	" "	2	"
R. W. Bell & Co.,	" "	2	"	E. R. Andrews,	" "	1	"
Thornton & Chester,	" "	1	"	James Duffey,	" "	1	"
Boller & Recktenwalt,	" "	1	"	John Smith,	" "	1	"
Commercial Advertiser,	" "	1	"	Gorsline & Otis,	" "	1	"
White & Brayley,	" "	1	"	Wallier, Erhard & Co.,	Syracuse, "	1	"
Brock & Wiener,	" "	1	"	Union Butter Pail Co.,	Jamestown, "	1	"
Geo. W. Hayward,	" "	1	"	Howes, Babcock & Co.,	Silver Creek, "	1	"
Thompson & Co.,	" "	1	"	Brooks Locomotive Works,	Dunkirk, "	1	"
R. Ovens & Son,	" "	1	"	G. W. Gates,	Frankport, "	1	"
Dental Manufacturing Co.,	" "	1	"	Remington & Son,	Ilion, "	1	"
Jewett & Keating,	" "	1	"	Garlick, Coleman & Co.,	Ilion, "	1	"
G. A. Prince & Co.,	" "	1	"	Bickford & Huffman,	Macedon, "	1	"
J. & N. C. Scoville,	" "	1	"	K. C. Barker, & Co.,	Detroit, Mich.,	1	"
C. Gilbert,	" "	2	"	Phœnix Furniture Co.	G'd Rapids, Mich.	1	"
Metcalfe & Cushing,	" "	1	"	F. Schumacher,	Akron, Ohio,	1	"
Miller, Greiner & Co.,	" "	2	"	Baumgarden & Langles,	New Orleans, La.	1	"
Richard Bullymore,	" "	1	"	D. & J. D. Edwards,	" "	1	"
Sweet, Cook & Co.,	" "	1	"	Jos. Hall Manuf'g Co.,	Oshawa, Ont.	1	"
Bickford, Curtiss & Deming,	" "	1	"	Armour, Dole & Co.,	Chicago, Ill.,	1	"

AND MANY OTHERS.

We refer to the following parties who are using our Hand Elevators:—

Jewett & Root,	Buffalo, N. Y.,	1	in use.	E. G. Spaulding,	Buffalo, N. Y.,	1	in use.
Commercial Advertiser,	" "	5	"	P. J. Hanour,	" "	1	"
Lautz Brothers,	" "	2	"	Goodyear Rubber Co.,	" "	1	"
Ripont & Keller,	" "	1	"	Barnard & Son,	Utica, N. Y.,	1	"
Granger & Co.,	" "	2	"	C. Gordon,	Rochester, N. Y.,	1	"
L. Gillig & Son,	" "	1	"	St. Mary's Hospital,	Rochester, N. Y.,	1	"
S. Bettinger & Co.,	" "	1	"	S. Stettheimer,	" "	2	"
Wallace Johnson,	" "	1	"	John Crouse & Co.,	Syracuse, N. Y.,	1	"
Chas. Freitag,	" "	1	"	McCarthy & Redfield,	" "	1	"
Comstock & Son,	" "	1	"	M. B. Bannister & Son,	" "	1	"
Henry Bull,	" "	1	"	O. H. Gordon,	Tonawanda, N. Y.,	1	"
H. Breitwieser & Bros.,	" "	1	"	N. B. Keeney,	Le Roy, N. Y.,	2	"
Fuchs Bros.,	" "	1	"	K. C. Barker & Co.,	Detroit, Mich.,	1	"
Sanford & Co.,	" "	2	"	John W. Strong,	" "	1	"
Henderson & Co.,	" "	1	"	G. S. Wormer & Sons,	" "	1	"
G. B. Gates,	" "	1	"	J. W. Ingersoll,	" "	11	"
Ph. Becker & Co.,	" "	1	"	H. George & Co.,	" "	7	"
Thos. Clark,	" "	2	"	G. F. Hinchman,	" "	1	"
S. O. Barnum & Son,	" "	1	"	Buhl, Ducharme & Co.,	" "	1	"
C. F. Nagel,	" "	1	"	G. Doty,	" "	1	"
John H. Gail,	" "	1	"	Dan'l Scotten,	" "	3	"
Jay Pettibone & Co.,	" "	1	"	Michigan State's Prison,	"	1	"
G. E. Newman,	" "	1	"	Geo. Partlow,	Greenville, "	1	"
Chamberlain & Joyce,	" "	1	"	F. W. Green & Co.,	Grand Rapids, "	1	"
W. G. Fargo,	" "	1	"	Jesse Hoyt,	East Saginaw, "	1	"
John Howell,	" "	1	"	Boyer & Fuess,	Erie, Penn.,	1	"
M. H. Birge, Sons & Co.,	" "	1	"	Wm. Sullivan,	Toledo, Ohio,	1	"
Philip Bachert,	" "	1	"	M. Walker,	Dubuque, Iowa,	1	"
Oppenheimer & Co.,	" "	1	"	James Massie,	Guelph, Ontario,	2	"
Murray Bros.,	" "	1	"	C. L. Baker,	Lindsay, "	1	"
James Brayley,	" "	1	"	Dr. T. Mack,	Springbank, Ontario,	1	"
Joseph Churchyard,	" "	1	"	W. Duffey,	Lindsay, "	1	"
Metcalfe & Cushing,	" "	1	"	Dolphin Manuf'g Co.,	St. Catherines, Ont.	1	"
Eagan Bros.,	" "	1	"	Morrison, Taylor & Co.,	Toronto, "	1	"
Bell Bros.,	" "	1	"	John Fisher & Co.,	" "	1	"
Wm. H. Green,	" "	1	"	John B. Smith,	" "	4	"
Mrs. L. C. Smith,	" "	3	"	Mason, Risch & Newcomb,	" "	1	"
F. Deming,	" "	1	"				

AND MANY OTHERS.

DIRECTIONS FOR ERECTING

THE

HOWARD ELEVATORS.

Setting up Guide Posts.

Line should be drawn from top to bottom of building, then commence at the bottom, take No. 1 Post, (as shown in cut), notched in on Hatchway, so as to get the proper distance between Posts, then No. 2 Post is spiked to No. 1 on the back side, in such shape as to bring them straight when crooked. Then spike on the casing as shown in cut. Care should be taken to place the Posts square with the Hatchways. Allow ¼ inch for clearance for Platform.

Putting on the Safety Ratchets.

After the line of Guide Posts is complete, the Safety Ratchets have simply to be screwed to the inner face of each line, commencing at the bottom, and carrying them up the centre in a straight line, squaring across frequently from Post to Post to ascertain if the ends of the Ratchets correspond in height from the bottom.

Putting in Platform.

After the Ratchets are all screwed in their place, take off four sections at the bottom, and swing the Platform into position, then raise the Platform about ten feet, and replace the Ratchets. To prevent the Platform from being drawn up so as to injure the sheave at the roof; in case of any derangement, two

Stop Blocks

should be prepared and firmly spiked to the faces of the Guide Posts at a point 12 inches below the under side of Sheaves. These should be 3 inches thick, 6 inches wide, and 18 inches long, tapered down to 1 inch thick at lower end.

Hand Chains.

When Hand Chain used entirely, it is the small, bright, twisted link Chain, and is to be used for controlling the movements of the machine. Its position is inside of the Hatchway, near one of the Guide Posts. In fixing upon its exact position, the manner of connecting it with the Shifter Drum of Lifting Power must be considered, and also it should be so placed as to be conveniently accessible from every floor of the building as well as from the Platform.

Directions for Putting up Hand Chains.

This Hand Chain, when connected, is endless, passing around one of the Hand Sheaves at the top, and another at the bottom of Hatchway.

Hand Sheaves.

These two Hand Sheaves are usually secured to pieces of 3 inch plank, 14 inches wide, and about 2 feet long one or both ends of which are beveled off from one edge, leaving 14 inches in the centre, or at one end full width, to receive the Sheaves. These pieces then being spiked to the side of the Guide Posts, the one having the Sheave in centre, at a point 9 or 10 feet above the top of floor of building, the other having the Sheave at the end directly under it, at the bottom of Hatchway, with the Sheaves as near the floor as possible.

How the Hand Chain Should Hang.

The Sheaves properly placed, the Chain drawn around them will hang clear of the outside of Platform, and the inside of Hatchway. Care should always be taken, in setting the Guide Posts, to leave room enough (about 2½ inches), between the Platform and inside of Hatchways at every floor where this Hand Chain is to be placed. The side of the Chain next the Guide Post should hang 2 to 3 inches from the Post.

Stop Iron.

The Stop Iron is to be secured to one of the uprights of Platform in such a position as that the side of the Hand Chain next to the Guide Post will pass through it, (the Stop Iron), and this side of the Hand Chain must be kept free from everything else, excepting the

Stops,

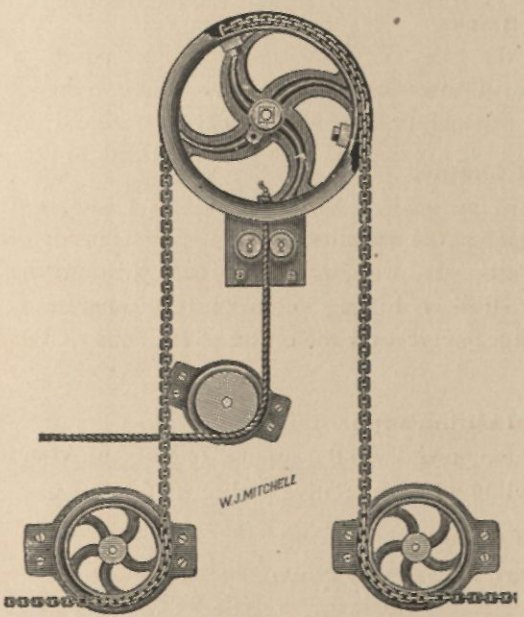
which are to be screwed to it about three feet above the lower and upper floors. The side of Hand Chain, farthest from the Guide Posts, will be turned around two other

Hand Sheaves Leading to Shifter Drum,

secured in any suitable manner, in such a position as to lead it directly toward the Shifting Drum, or Lifting Power.

Placing the Hand Chains.

To put on the Hand Chain, the Sheaves being all put up, pass one end around the upper Sheave, letting the end run down near the Guide Post, and through the eye of Stop Iron on Platform, then around the Sheave at the bottom, and up to the lower Sheave leading to the Lifting Power over which it will pass. Then drop the other end of Chain down from above, and pass it under the other Sheave leading to the Lifting Power over which it will pass.



Attaching Hand Chains.

Then drop the other end of Chain down from above, and pass it under the other Sheave leading to Lifting Power. These two ends will pass to and directly around the Shifter Drum in opposite directions, attaching to the staple, or else, if the Lifting Power is some distance away, connecting by means of a piece of small wire rope, or rod.

General Directions for Locating the Machine for Lifting Power.

The Machine, or Lifting Power, should be placed as near to the Hatchway as possible, so as to bring Lifting Rope behind the Post.

Lifting Power and Counter-shaft

The Shaft or Counter-shaft for driving the machine should be about 12 feet distant from the Pulleys on the machine.

Lifting Power and Hand Chains.

The Hand Chain or Rope must be extended from the Hatchway to the Shifter Drum without crossing any of the Hatchway, and without coming in contact with the Lifting Power or the Belts.

Lifting Power, Large Sheave and Hatchway.

The Wire Lifting Rope must pass from the large Drum of the machine to the large Sheave over the Hatchway, without interfering with the passage of the Platform.

These important considerations must determine the location of the Lifting Power.

Vibration of Lifting Rope.

The distance above referred to between the Hatchway and the Lifting Power is only necessary to allow for the vibration of the Lifting Rope as it winds upon the Drum, to prevent its chafing on the Sheave over the Hatchway. This difficulty may, however, be overcome, and the Lifting Power placed near the Hatchway, if necessary, by the use of a

Vibrating Sheave,

on a long axle so as to vibrate.

Lifting Power over Hatchway.

In some cases, where the roof over the Hatchway is 14 or 15 feet high, and strongly timbered, it is advisable to place the Lifting Power directly over the Hatchway, the Lifting Rope passing from the large Drum to the Platform.

Lifting Power in 1st, 2d and 3d Stories below Roof.

If it is found inexpedient to place the Lifting Power in the attic or top story, it may be secured to the first, second, or third below; and in this case the Lifting Power may be in any convenient position near the Hatchway, or otherwise, but of course keeping as near the Hatchway as practicable.

Relative Positions of Lifting Power and Hatchway.

When the Lifting Power is located some distance down from the roof, two, and in some cases three large Sheaves are required in conveying the rope from the Drum to the centre of Hatchway at roof.

Number of Large Sheaves Required.

If possible, the third Sheave should be dispensed with, by allowing the Lifting Rope to pass directly from the large Drum perpendicularly to the roof, and then turning on a large Sheave and leading directly to the large Sheave over the centre of Hatchway, and down to the Platform.

Directions of Lifting Rope.

The Rope, in crossing between these two large Sheaves, may generally run in any direction or at any angle corresponding with the relative positions of Hatchway and Lifting Power.

Vibrating Sheaves for One Story Down.

The exception is, when the Lifting Power is but one story down from the roof, and the vibration of one or both large Sheaves is thereby rendered necessary. In this case, (unless the Rope is carried off horizontally, as referred to hereafter), the Lifting Power must be placed exactly opposite the centre of the Hatchway, so that the direction of the Lifting Rope, as it crosses between the Sheaves at the roof, shall be at a right angle with the Shafts of the Lifting Power.

Horizonial Lifting Rope.

In some cases it is necessary to carry the Lifting Rope horizontally from the Drum for some distance before turning it upwards to the roof, caused by some obstruction or interference in its passage directly upwards from the Drum, or in crossing from Sheave to Sheave at the roof.

The Third Large Sheave.

The third large Sheave then becomes necessary, and this will be placed at the point determined upon for turning the Rope upwards.

Carrying the Rope up Hatchway.

If feasible, this Sheave may be placed so as to lead the Rope up the Hatchway in the space between the Platform and floors, but the distance necessary for the proper

Vibration of the Rope.

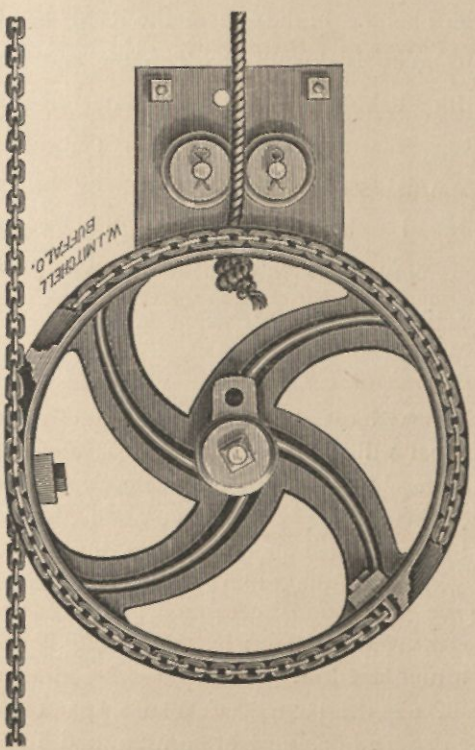
must be preserved, or else this Sheave must vibrate with the Rope. If it happens that the Frames come parallel with the floor timbers, it will be necessary to bolt

Three Bridge Pieces

across the floor timbers to which the Frames will be bolted.

Direction for Brake.

Place the Pinion so as to stand in centre of Rack over the Shifter Bar, where the Crank which holds the Brake lever down against the Pulley is located, then connect the Chain or Shifting Rope around the three-grooved Wheel, in opposite directions, and the Check Rope in the centre of the two small Sheaves, in the three-grooved Wheels, so that when you turn the three-grooved Wheel in either direction, it will wind the Check Rope on the wheel, and bring it back to the same position where started from; the Shifting Chain or Wire Rope should have ¾ of a turn around the Grooved Wheel, when the Brake is in centre.



Stops, Hand Chains and Belts.

In connecting this Hand Chain to the Shifter Drum, particular care must be taken to connect it so that the movement of the Platform in either direction will, upon coming in contact with the Stop, move the Chain in the direetion that will throw the belt then driving the machine upon the loose Pulley, and thus stop the machine.

Stop Pins in Shifter Bar.

To prevent the Belts from being thrown too far either way, put the Stop Pins through the Bar, so as to strike inside of Frames at the proper point. When the machine is in motion, the belt then driving it should run just clear of the loose Pulley. Check or Stop Rope should come down along side of

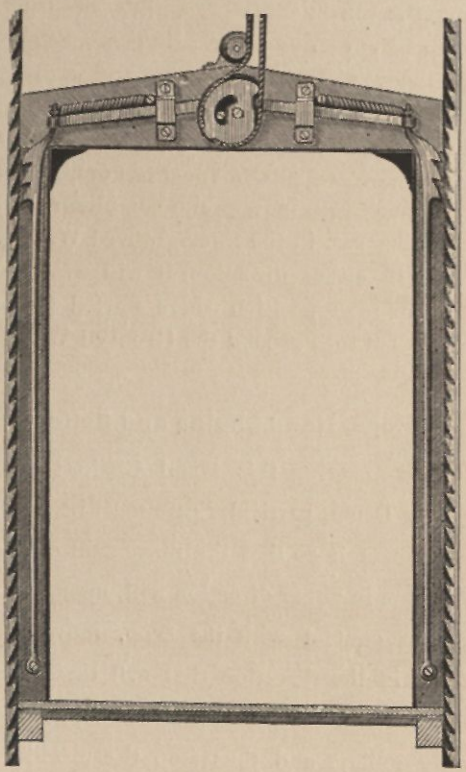
Shifting Rope, pass over a small Sheave on top, then run out of way to the three-grooved Wheel, passing between the two small Rollers as shown in cut No. 3.

Its Use.

This Stop Rope, being properly adjusted, a pull on it will always bring both Belts to their exact places on the loose Pulleys, applying the Brake at the same time to the tight Pulley, and stopping the machine. This Stop Rope is easily kept in order, and it is important that it should be habitually used in stopping the machine. A piece of Raw Hide Rope must be put on end of Check Rope where it passes through the roller.

The Turnbuckle.

Before finally connecting the Hand Chain, the Turnbuckle should be placed in the side farthest from the Guide Post, at any point where it may be conveniently reached for the purpose of taking up the slack chain. The Hand Chain should always be kept screwed up, allowing no loose chain below the lower Hand Sheave.



Directions for Lifting Rope and Counter-Weight Rope.

Take the Cam out of the Platform, pass the Rope for Counter-weight through the bottom slot, then up through the Hatch-way over the Sheave for Counter-weight, then take the other end of the Rope the same way over Sheave to the machine—put the Thimble on the end of the Rope, bend the Wire back into the Thimble and fill with Babbit-metal; the Counter-weight Rope is fastened in the same way; also the Cam is fastened to the Rope by being pressed back with a nail or wedge. Proper care must be taken to make all these connections firm and strong.

The Position of Large Sheaves.

The position of the large Sheave at the roof will of course be mainly determined by the arrangements of the other parts of the machine. Where there is not sufficient height in the upper story for the Sheaves, they should be put on the roof, and covered water-tight. The usual way of securing the Sheaves is to bolt the hangers firmly to a hard wood plank 4 inches thick, 12 inches wide, and from 8 to 12 feet long, so as to reach across the Hatchway, and rest on the Upright Ways.

Directions for Oiling Machine.

Fill the Hollow Steel Shaft with good oil, take the large Screw Blocks out of the side of the Drum where you will find a piece of pipe in an upright position, and fill as

much as it will hold. When these Pipes do not come to a perpendicular position they will have to be changed. We always send the machine out fixed with the oiling arrangement for Hanging against the joist.

Directions for Changing Inside Oiler.

In cases where the machine is bolted against the wall, take the Key out and turn the Trunnion which the Drum revolves on, one-quarter turn for the other Key Seat. When the machine is to stand on the floor, the Drum must be taken apart and the Pipe secured in the opposite hole, on the Trunnion base After the machine has run a day or two, about one gallon of oil should be put inside of the Drum through the same hole where the gas pipe is filled, so as to oil the gearing. Care must be observed that all the holes in the Hollow Steel Shaft are filled with leather, to prevent the oil from running out too fast. When these points are all observed the machine does not require oiling for weeks.

Directions for Starting the Machine.

Start the machine always before connecting the Lifting Rope; see if the Shifting Rope or Chain works all right, if so, then connect the Lifting Rope. Put on a Stopping Brace on Platform, run the engine somewhat slower, run the Platform to the top, and then connect your Counter-weight Rope, then your Safety Attachment will be in power, and not until then. Reverse your machine, and in case you find the Lifting Rope slacks off, *reverse your machine immediately*, put more weight on the Platform, until the Lifting Rope will not slack off. Run the machine one or two days, then grease the ways for the Platform.

Adjusting the Brake.

When it is found that the Brake will not hold a heavy load the nuts on top of the Rubber Spring should be tightened, but not too tight; when too tight the machine is likely to start of its own accord.

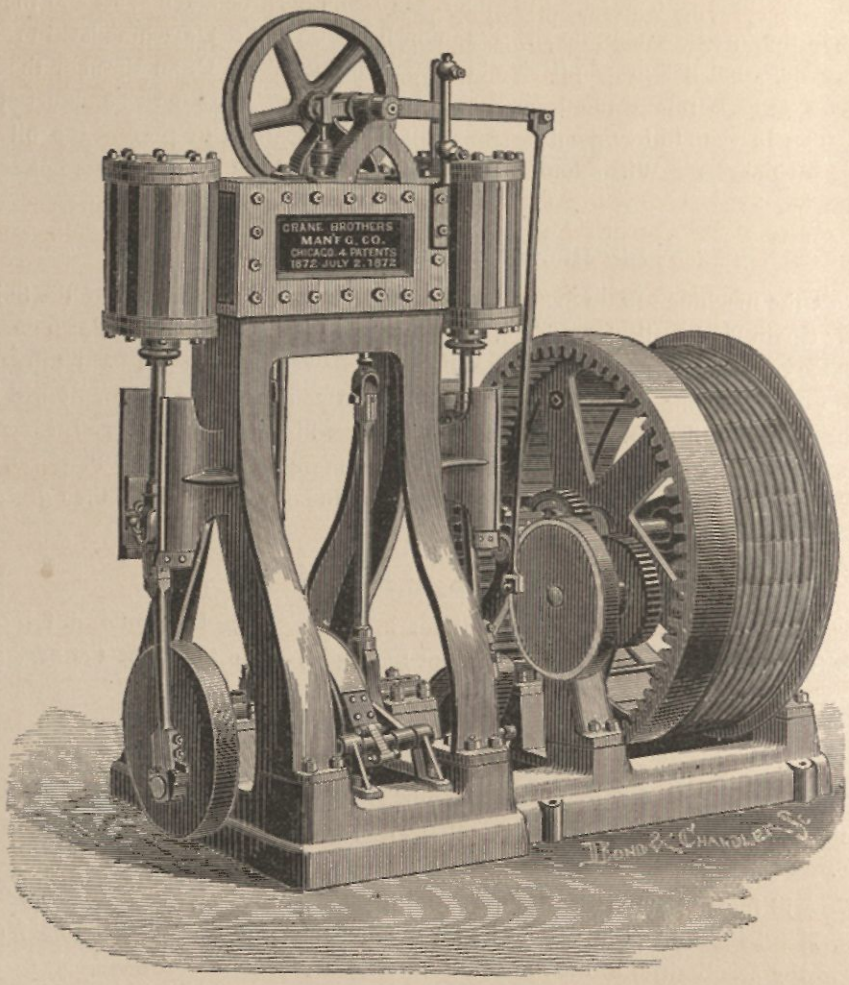
About Speed.

The Pulley on the Internal Gear Machine should run 150 revolutions, which will make the Platform travel 40 feet per minute; 175 revolutions will give 50 feet per minute.

We will furnish, on application, special instructions in regard to the speed of our Screws, Hand Elevators, and machines for use in Hotels, Mines, Blast Furnaces, &c., suited to the peculiarities of the location of each machine.

CRANE'S

SAFETY HOISTING ENGINES.



DIRECT GEARED AND AUTOMATIC.

ESPECIALLY DESIGNED FOR

BLAST FURNACES, AND COAL, IRON, AND OTHER MINES.

BUFFALO, N. Y.

CRANE'S DIRECT-GEARED

Automatic, Safety Hoisting Engines.

By the Engraving, on the preceding page, it will be seen that the Crank-Shaft gears directly into the Winding Drum, and that the Link Motion (with its complications) usually applied to this class of machines is dispensed with, both of which improvements simplify this machine to a great extent.

We manufacture three sizes, which are adapted to all classes of Furnaces and Mines; and make them with Double Drums, when required.

They are constructed with Automatic Stops, to prevent overwinding, and are under perfect control of the man at the top of the landing who attends to the running of the Barrows or Cars. *Not requiring an Engineer to attend the Engine* as in the old method.

In no case can the Engine overwind the Cables. The Automatic Stop alwavs stops the Engine when the platform reaches the proper point. The Drums and Engines are adjusted to one Bed Plate, thus insuring perfect alignment; and all parts are built by Machinery designed expressly for their construction.

These Machines are in use by the following parties:

Joliet Iron and Steel Co.	Joliet, Illinois.
Lillie & Plumb	Streator, "
Chicago, Wilmington and Vermillion Coal Co.	" "
Spearman Iron Co.	Sharpsville, Pa.
Pierce Kelley & Co.	" "
Ormsby Furnace Co.	" "
Neshannock Iron Co.	New Castl-, "
Wheeler Iron Co.	Middlesex, "
Triumph Iron and Coal Co.	Jackson, Ohio.
Ætna Iron Works	Ironton, "
Columbus Coal Co.	Columbus, "
Columbus Iron Co.	" "
Charles Ambos & Co.	" "
Franklin Iron Co.	" "
Glasglow-Port-Washington Iron and Coal Co.	Port Wash, Ohio.
Vigo Iron Co	Terra Haute, Ind.
Vulcan Iron Works	St. Louis, Mo.
Garrison, Choteau & Hart	" "
Winthrop Iron Co.	Ishpeming, Mich.
Jackson Iron Co.	Negaunee, "
Lake Superior Iron Co.	Marquette, "
Frankfort Iron Co.	Detroit, "

Parties wishing Estimates will please state—

1st. The amount of material to be raised in twenty-four hours.
2d. The height of Stack or depth of Shaft.
3d. The Load to be raised.
4th. The usual pressure of Steam.
5th. The size of Platform.
6th Ground Plan of Shafts and Engine House.
7th. If to replace old machine, state what old material, if any, can be used.

Inquiries answered, Estimates furnished and Contracts made by

THE HOWARD IRON WORKS,

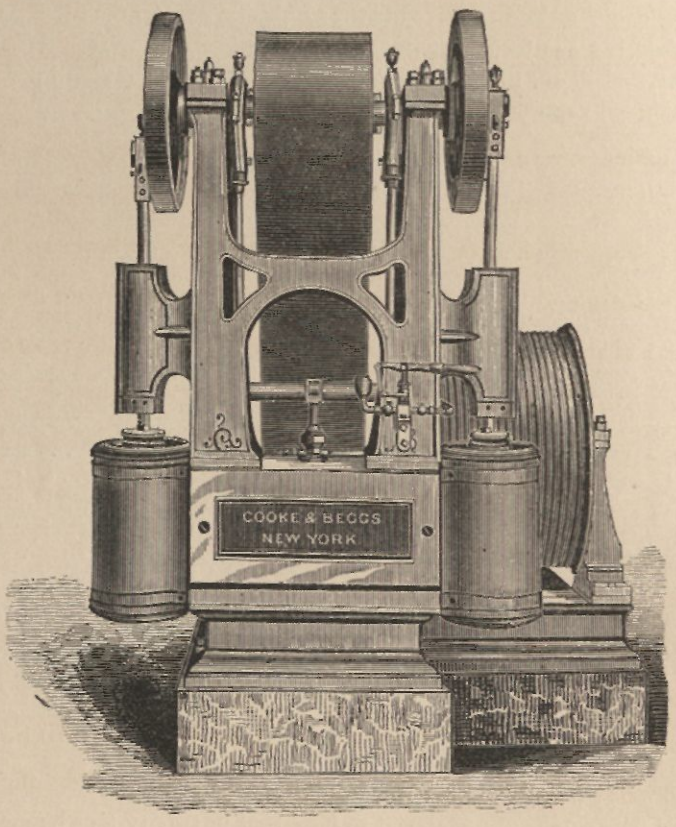
BUFFALO, N. Y.

CRANE'S PATENT SAFETY

STEAM

FREIGHT AND PASSENGER ELEVATOR

ENGINES.



FOR

HOTELS, STORES, OFFICE BUILDINGS,

WAREHOUSES, &c.

DESCRIPTION OF

CRANE'S PATENT SAFETY ELEVATOR ENGINES.

The accompanying Engraving represents a FRONT ELEVATION OF CRANE'S PATENT DUPLEX STEAM ENGINE, DESIGNED EXPRESSLY FOR FREIGHT AND PASSENGER ELEVATORS. All parts of these Engines are in full proportion to the greatest task of their cylinders. They are Reversible WITHOUT LINKS, in place of which is adjusted a very simple form of Valve Motion, using one Eccentric and Plain Slide Valve to each Engine, that Reverses, or Stops the Engine at the will of the Conductor on the Elevator platform. These Valves are easy of access, and are readily understood by any ordinary machinist or engineer. They are superior to every form of Valve Motion now in use on any other Elevator Engine. In combination with the Engine and Drum is adjusted our Positive Safety Stop, which stops the Engine at the upper and lower landings, independent of the Operating Cable. Also, BEGGS' PATENT STOP MOTION, which will stop the Engine should the Cables become loose on the Drum, or from any cause become out of place. Also, a Device to stop the Engine instantly should the Driving Belt break. Also, a Brake that is applied when the Engine is stopped, and relieved when the Engine is in motion. All these Devices work automatically in combination with the Engine, and are STRONG, POSITIVE, and RELIABLE.

The Engines and Drums are secured to one bed plate, and held in place by well-fitted bolts, thus rendering it impossible for any part of the machines to get out of line.

These Engines are constructed under the best system that can be organized in any modern machine shop, with tools that are designed expressly for their manufacture. All parts are made to standard gauges and templets, thus insuring perfect alignment and the most accurate workmanship. Over 200 of them are in successful operation in Chicago, St. Louis, Cleveland, New York, and other cities.

We are prepared to furnish proposals to erect these Passenger and Freight Elevators, and would invite attention to their superior merits.

Inquiries answered, Estimates furnished and Contracts made by

THE HOWARD IRON WORKS,

BUFFALO, N. Y.

PRICE LIST

OF

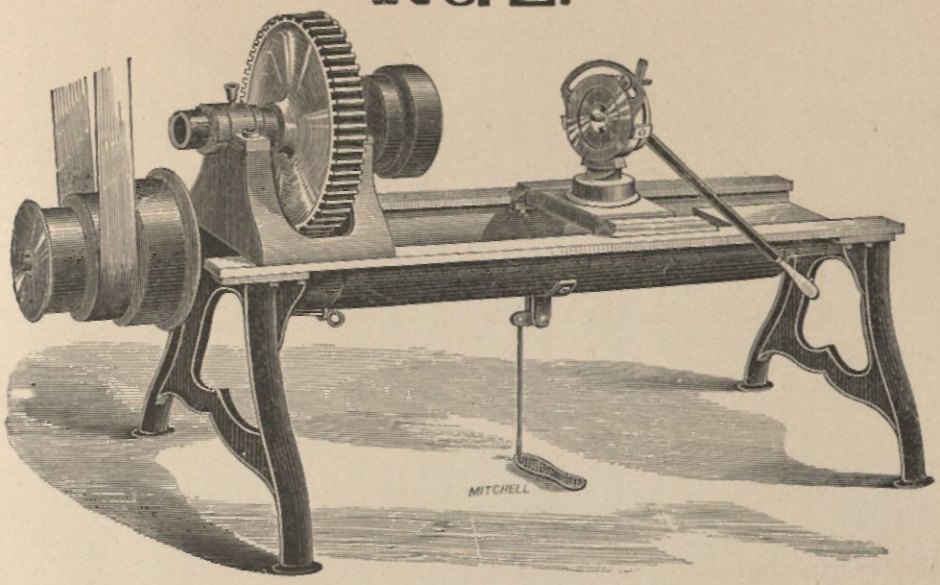
EXTRA PARTS.

OF

ELEVATORS.

Safety Ratchets, 60c. per lineal ft.	
Large Leather-covered Sheave and Hanger, 27 inches diameter,	27.00
Large Leather-covered Sheave and Hangers, 18 inches diameter,	18.00
Large Leather-covered Sheave and Hanger, 12 inches diameter,	12.00
Hand Rope Sheave, from 5 inches to 15 inches diameter	15 per lb.
Counter-weight Grooved Planed,	6 per lb.
¾ in. Wire Rope	40 per foot.
⅝ in. Wire Rope	30 per foot.
½ in. Wire Rope	25 per foot.
000 Hand Chain	10 per foot.
Gas Pipe	9 per foot.
Dogs on Gas Pipe	75 each.
Brackets	50 each.

No. 2.



Patented July 4th, 1865.

SCHLENKER'S STATIONARY-DIE BOLT CUTTER.

We manufacture three sizes of these machines. The largest size, our No. 3, is not illustrated by a cut, but, as will be seen by reference to the price list, under the description of our No. 2½, it is a strong and powerful tool, adapted to the largest sizes of work.

The above is a cut of our No. 2 STATIONARY-DIE BOLT CUTTER. In design and construction it is similar to our No. 2½, is operated in the same manner, works as accurately, and cuts the same variety of threads. It is, however, of smaller capacity, and not intended for as large and heavy work. We have sold over 600 of these machines, and do not hesitate to guarantee satisfaction on all work for which we recommend them.

Price of No. 2 Bolt Cutter, with improved Chuck, including 8 sets Dies, 8 Master Taps for re-cutting dies, Cone, Pulleys, Counter-shaft, Hangers, and Nut Holder, - - - - - - - - - $300 00

The above machine cuts V thread ⅜ to 1½ inches inclusive, and with an additional center to cutter head, so as to receive a wider die, and by ordering square dies which we furnish at list price, it will cut square threads ⅜ to 1¼ inches inclusive. Price of the extra center, including 3 sets Dies, 3 Master Taps, $ 30.00

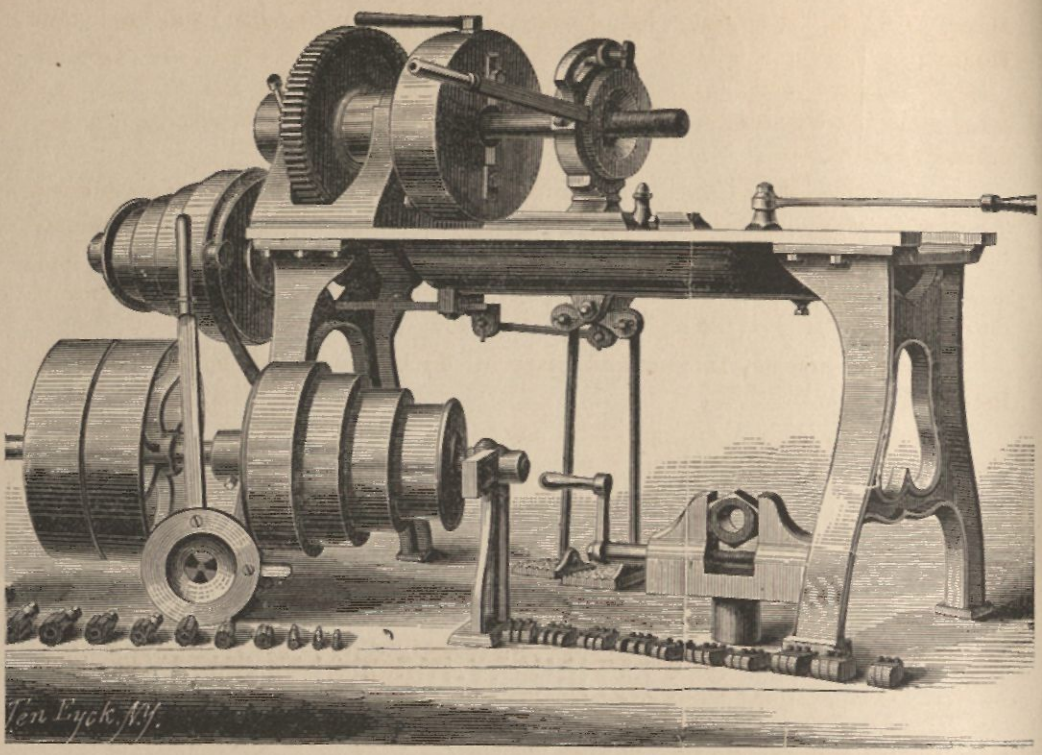
Speed of Counter-shaft, from 175 to 200.

DIES FOR STATIONARY DIE BOLT CUTTERS.

Narrow Dies for No. 2 and 2½ Cutter-head, per set, blank,	$1.50
Cutting same, per set,	.75
Wide Dies No. 2 and 2½ Cutter-head, per set, blank,	2.25
Cutting same, per set,	.75
Narrow Dies for No. 3 Cutter head, per set, blank,	4.50
Cutting same, per set,	1.00
Wide Dies for No. 3 Cutter-head, per set, blank,	6 00
Cutting same,	1.50

Dies must be cut in the head in which they are to be used.

No. 2½



Outer bearing to Cone not shown in cut.

SCHLENKER'S STATIONARY DIE BOLT CUTTER.

PATENTED JULY 4th, 1865

The above cut shows the Bolt Cutter complete. The superiority of these Bolt Cutters consists in the perfect clean cut of the thread, with one passage over the iron, the rapidity and ease of its action, uniformity of its work, simplicity and durability.

The arrangement of the dies is such, that as soon as they begin to cut, they will close as far as the stop will allow them, and the bolts will be cut the same size, any length.

As soon as the bolt is cut its required length, the dies are opened by the lever and the bolt taken out WITHOUT THE NECESSITY OF RUNNING BACK OFF THE THREAD.

The action of the dies is the same as a lathe tool, taking a clean chip, which leaves the thread firm and strong.

The dies can be sharpened by grinding. When too much worn, they can be taken out of the head, annealed, re-cut and tempered. In cutting short bolts, a plug socket is placed in the jaws, which will admit the head of the bolt. In using the socket, it is not necessary to stop the machine to take out or re-place the bolt. One socket will answer for all bolts, if it will admit the head and not allow it to turn.

Besides the ordinary V shaped thread, the machine will cut coach screws, and square threads, double and single, such as vise, piano stool, letter-press and cider mill screws.

The machine will also tap nuts of corresponding sizes to bolts cut.

Price of No. 2½ Bolt Cutter, with improved Chuck, including 11 sets Dies, 11 Master Taps for re-cutting Dies, Counter-shaft complete, Parallel Vise and Nut Holder, - - - - - - - - - - - - - - - $400.00

This Machine has two centers to Cutter-head, and cuts V thread ⅜ to 2 inches inclusive, and square threads ⅜ to 1½ inches inclusive, has back gear with seven different speeds, making it a very desirable Machine.

Price of No. 3 Bolt Cutter, with improved Chuck, including 9 sets Dies, 9 Master Taps for re-cutting dies, Counter-shaft complete, and Parallel Vise, - $500.00

This size cuts V thread ¾ to 2¼ inches inclusive, and with an extra center to Cutter-head, so as to receive a wider die; it will cut V thread up to 3 inches, and square thread up to 2¼ inches. Price of extra center, including 3 sets Dies and 3 Master Taps, $100.00.

Nut Taps are not included in price of Machine, but will be furnished at list price.

Speed of Counter-shaft from 175 to 200.

MACHINE OR NUT TAPS.

LONG SHANK.

Diameter.	Price each.	Diameter	Price each.	Diameter.	Price each.
1–4	$0 60	7–8	$2 10	2	$ 7 70
5–16	70	15–16	2 40	2⅛	10 80
3–8	80	1	2 80	2¼	12 15
7–16	90	1 1–8	3 20	2⅜	13 80
1–2	1 00	1 1–4	3 70	2½	15 65
9–16	1 15	1 3–8	4 20	2⅝	17 70
5–8	1 30	1 1–2	4 70	2¾	20 15
11–16	1 45	1 5–8	5 30	2⅞	22 85
3–4	1 60	1 3–4	6 00	3	25 90
13–16	1 80	1 7–8	6 80	3⅛	29 20

Taps of irregular shape or length of shank made to order at special prices.

Hubs or Master Taps, are 25 per cent. higher than Nut Taps. State in ordering whether for solid or open dies.

In ordering tools, always state the thread wanted.

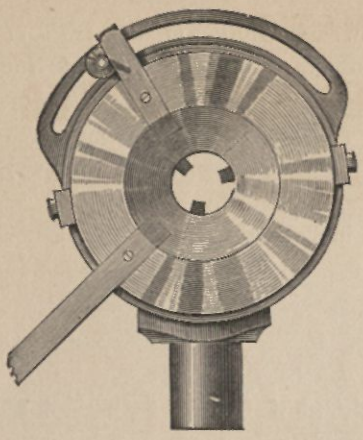
We can furnish the above a 32d over size.

The Following is the Philadelphia Standard for

SCREW THREADS FOR BOLTS AND NUTS,

As Adopted by the Franklin Institute in 1864.

Diameter of Bolt.	Threads. No.	Diam. of Bolt.	Threads. No.	Diam. of Bolt.	Threads. No.	Diam of Bolt.	Threads. No.	Diam. of Bolt.	Threads. No.
1–4	20	3–4 in.	10	1 5–8 in.	5 1–2	3 in.	3 1–2	4 3–4 in	2 5–8
5–16	18	7–8 "	9	1 3–4 in.	5	3 1–4 in.	3 1–2	5 in.	2 1–2
3–8	16	1 "	8	1 7–8 in.	5	3 1–2 in.	3 1–4	5 1–4 in.	2 1–2
7–16	14	1 1–8 "	7	2 in.	4 1–2	3 3–4 in.	3	5 1–2 in	2 3–8
1–2	13	1 1–4 "	7	2 1–4 in.	4 1–2	4 in.	3	5 3–4 in.	2 3–8
9–16	12	1 3–8 "	6	2 1–2 in.	4	4 1–4 in.	2 7–8	6 in	2 1–4
5–8	11	1 1–2 "	6	2 3–4 in.	4	4 1–2 in.	2 3–4		

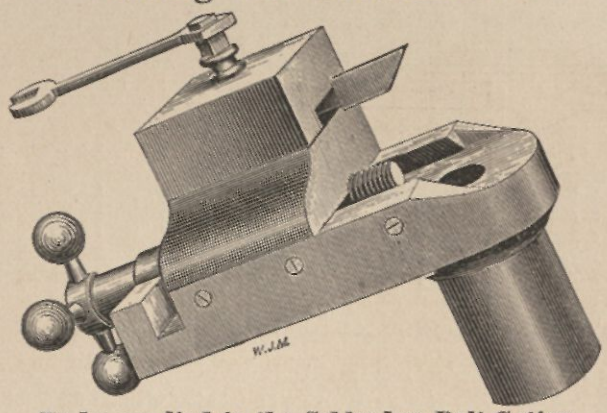


BOLT CUTTER HEAD.

The annexed cut represents the Cutter Head for our Stationary Bolt Cutter. It is in general use thoughout the United States and the Dominion, and is regarded by all machinists as a *first-class Tool.* It can be attached to old Bolt Cutters that do not work satisfactorily, or can be applied to Lathes. It is beyond question, the best tool in the market for cutting *Square Threads.* We manufacture three sizes, and give prices below :

No. 2 Cutter Head, with 8 sets Dies, - - -	$100
No. 2½ Cutter Head, two centers, with 11 sets Dies, -	130
No. 3 Cutter Head, with 9 sets Dies, - -	125
No. 3 Cutter Head, two centers, with 12 sets Dies, -	175

Cutting Off Attachment



To be applied to the Schlenker Bolt Cutter.

Price, No. 2 and 2½, $35.00. Price, No. 3, $40.00.

We give herewith an illustration of our Cutting Off Attachment. It will be found a very *useful* and *convenient tool* in connection with the Schlenker Stationary-Die Bolt Cutter, for cutting shafting the required length, doing it more rapidly than it can be done in a lathe, and leaving a square end, which is not the case, when cut by hand. It will soon save its cost in the *time* of workmen employed to do the same work.

The subjoined letter is from a well-known firm, who are using the machine on heavy as well as light work :

OFFICE OF THE PENN BRIDGE AND MACHINE WORKS,
T. B. WHITE & SONS, PROPRIETORS.
New Brighton, Pa., Dec. 2d., 1875.

R. L. HOWARD Esq., Buffalo, N. Y.,

Gentlemen:—Please send us by express, one set Jaws, for head, for No. 2½ Bolt Cutter, we mean the jaws that hold the rods when being cut. We are very much pleased with our "Schlenker," and cut on it yesterday, in five hours, fifty Bridge Bolts, 2 inches in diameter, 23 feet 6 inches long, with 9 inches of thread on each end, and the man that run the machine, also did the firing, and run our engine, and had one man to help him handle the bolts, which we think was doing very well.

Yours, respectfully,

T. B. WHITE & SONS.

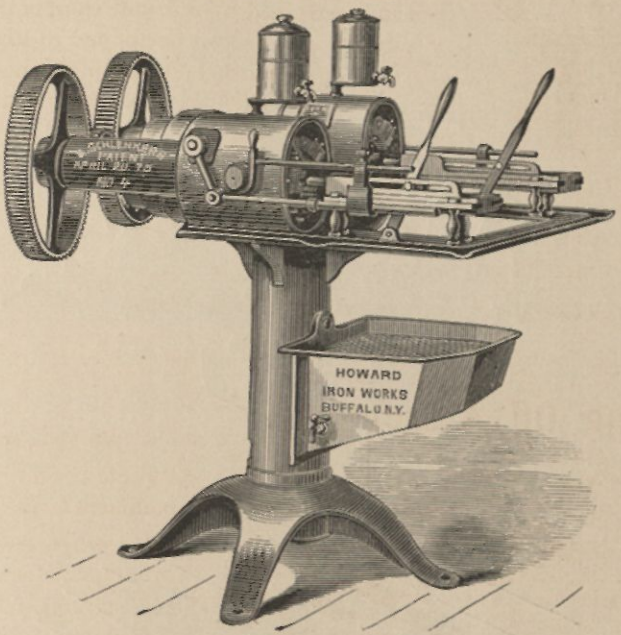
SCHLENKER'S AUTOMATIC

REVOLVING-DIE DOUBLE-HEADED BOLT CUTTER

AND

NUT-TAPPING MACHINE.

No. 4



PATENTED APRIL 20th, 1875.

This machine will cut threads on bolts and tap nuts from ¼ inch to ⅞ inch inclusive, increasing by sixteenths to ½ inch in diameter, and above that size, by eighths. We furnish with this machine, 16 sets Dies with steel Chucks, 8 Master Taps, 8 Nut Tap Holders, 3 Dies and Chucks for nut tapping, 2 large Oil Cans, 1 Oil Reservoir with Strainer, Counter-shaft complete, and steel Wrench. Nut Taps are extra, but we furnish them at list prices, when ordered.

Price of Machine in Buffalo, - - - - - - ~~$550.00~~ 400,

Boxing and cartage, extra.

Speed of Counter shaft, from 225 to 250 revolutions per minute.

Additional Dies will be furnished at the following prices:

Steel Chucks, with Dies cut, per set of three, - - - - - -	$5.25
Blank Dies for same, per set of three, - - - - - - - - -	1.50

All orders will be filled according to the Franklin Institute Standard, unless otherwise ordered.

This machine is constructed on the same principle as our Nos. 5, 6, and 7, and is designed more particularly for manufacturers of small bolts. Having *two heads* for cutting, its capacity is nearly *double* that of our No. 5, or from 4 to 6 thousand per day, depending somewhat upon the size of the bolt. ~~No bolts however, can be cut in this Machine of a greater length than twelve inches.~~ The dies open and close *automatically;* they can be readily changed from one size to another; are simple in construction; and can be re-placed with small expense. One head can be used for tapping the nut, at the same time the bolt is being cut in the other head, or both can be used *simultaneously*, for either bolt cutting or nut tapping. It cuts the same variety of threads as our other Bolt Cutters, has three different speeds, and will be found peculiarly adapted to the manufacture of *Carriage Bolts, Plow Bolts, Joint Bolts*, and *Fish Plate Bolts.*

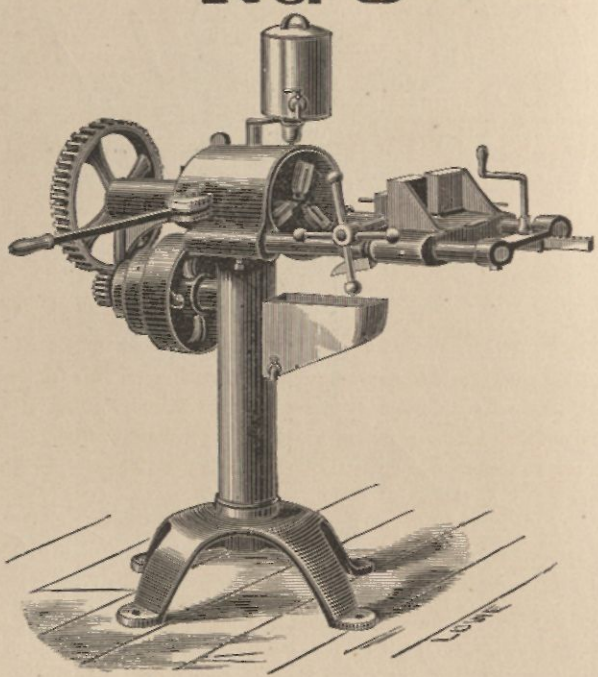
SCHLENKER'S AUTOMATIC

REVOLVING-DIE BOLT CUTTER

AND

NUT-TAPPING MACHINE.

No. 5



Patented April 20th, 1875.

This machine will cut threads on bolts and tap nuts from ¼ inch to 1¼ inches inclusive, and is adapted to either hand or belt power. We furnish with the machine 9 sets Dies, with steel Chucks, increasing by eighths, 9 Master Taps, 9 Nut Tap Holders, 3 Dies and Chucks for nut tapping, large Oil Can, Oil Reservoir with strainer, Counter-shaft complete, and steel Wrench. Nut Taps are extra, but are furnished at list prices when ordered.

Price of Machine in Buffalo, - - - - - - - ~~$250~~ 215

Boxing and cartage extra.

Speed of Counter-shaft from 200 to 225 per minute.

Additional Dies will be furnished at the following prices:

Steel Chucks with Dies cut, per set of three, - - -	$5.25
Blank Dies for same, per set of three, - - - - -	1.50
9 Nut Taps from ¼ to 1¼ inch, increasing by eighths, -	17.10

All orders will be filled according to the Franklin Institute Standard, unless otherwise ordered.

This machine possesses many advantages over any competitor. The dies are *opened automatically* when the desired length of thread has been cut on the bolt, and are closed by the lever as shown in the cut of the machine. It can be changed from one size to

another *in less than one minute.* It does not require skilled labor, but can be operated by any competent boy. It is a very *rapid worker;* its capacity being from 3,000 to 3,500 5/8 bolts with 1½ inches of thread per day. The machine is simple in construction, very compact and strongly built, and is offered much below the price of any other machine capable of cutting the same sizes, and amount of work. It will cut *square threads, coach screws,* and a *V thread,* and will take in *crooked* as well as straight work. For *jobbing shops,* or parties requiring bolts of different sizes, it is beyond question the most *desirable machine* in the market. We give a few letters from well-known firms that have given our machine a thorough test.

BUFFALO, N. Y., Dec. 23d, 1875.

R. L. HOWARD, Esq.,

Gents:—We have used your No. 5 Bolt and Nut Cutting Machine for the last two months, and think that it is the best machine of the kind in the market. We would recommend it to any one in need of a Bolt Cutter.

Yours respectfully,

DEMPSTER & COMSTOCK.

PARIS, Ont., Canada, Dec. 23d, 1875.

R. L. HOWARD, Esq., Buffalo, N. Y.,

Dear Sir:—Please send me, as soon as possible, one extra set of Dies for the Bolt Cutter I bought from you, to cut small set-screws made out of 5 1–6 iron, 18 threads to the inch. Make the Taps a little larger, as the bolts when made are always somewhat larger than the iron.

I have only to say, in reference to the machine, that it is complete, and works, since I started it, to my entire satisfaction.

Yours respectfully,

DAVID MAXWELL.

THE JOHNSTON HARVESTER COMPANY,

BROCKPORT, N. Y., April 5th, 1876.

HOWARD IRON WORKS, Buffalo, N. Y.,

Gentlemen:—Yours of the 31st March, duly came to hand. In reply, can say that it is with pleasure I can recommend your Bolt Cutters, but especially your *Improved,* of which we have two. They are, without doubt, the best adapted to our business of any Bolt Cutter in the market.

I am, Yours truly,

M. M. OLIVER,

Sup't Johnston Harvester Co.

GREEN ISLAND MALLEABLE IRON WORKS,

TROY, N. Y., April 3d, 1876.

HOWARD IRON WORKS, Buffalo, N. Y.,

Gentlemen:—In reply to your favor of March 29th, we would say that the Schlenker Bolt Cutter continues to give excellent satisfaction in bolt cutting, nut tapping, and reaming. We have not attempted to run it up to its full capacity for the ten hours; our bolt cutting is principally plow bolts, 9 1–6 to 5–8 inches diameter, and are cut up from 1 inch to 1½ inches. We have had no trouble in cutting them at the rate of 2,600 per day, and think we could run it up to 3,000 per day. We have had no breakages of taps or dies, and so far as our experience goes, think it the best Bolt Cutter manufactured.

Yours truly,

TORRANCE, MERRIAM & CO.

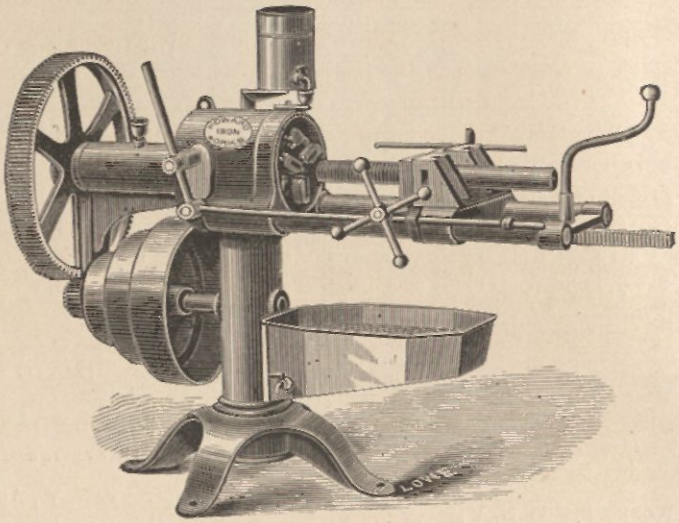
SCHLENKER'S AUTOMATIC

REVOLVING-DIE BOLT CUTTER

AND

NUT-TAPPING MACHINE.

No. 5½



Patented April 20th, 1875.

This machine will cut threads on bolts and tap nuts from ⅜ to 2 inches inclusive, and is arranged for belt power. We furnish with this machine, 14 sets Dies with steel Chucks, increasing by eighths, 14 Master Taps, 14 Nut Tap holders, 3 Dies and steel Chucks for nut-tapping, large Oil Can, Oil Reservoir with Strainer, Counter-shaft complete, and Steel Wrench. Nut Taps are extra, and furnished at list price, when ordered.

Price of Machine in Buffalo, - - - - ~~$55~~ 400

Boxing and cartage extra.

Speed of Counter-shaft from 175 to 200 per minute.

For extra Taps and Dies see next page.

Additional Dies will be furnished at the following prices:

Steel Chucks with Dies cut from ⅜ to 1⅜ inch inclusive, per set of 3,	$ 9.00
Blank Dies for same. per set of 3,	1.50
Steel Chucks with Dies cut from 1⅜ to 1¾ inches inclusive, per set of 3,	11.00
Blank Dies for same, per set of 3,	2.50
Steel Chucks with Dies cut from 1⅞ to 2 inches inclusive, per set of 3,	12.00
Blank Dies for same, per set of 3,	3.00
14 Nut Taps, from ⅜ to 2 inches, increasing by eighths,	51.20

All orders will be filled according to the Franklin Institute Standard, unless otherwise ordered.

The style of the machine is similar to that of No 5; it has all the improvements in that machine, and some *advantages* which No. 5 does not possess; is fully as rapid a worker, is adapted to larger sizes of bolts, and cuts a *perfect* and *clean* thread in once going over the bolt. The Dies are arranged to open and close *automatically*, and do not require the *constant attention* of the operator; threads cut by this machine, will not vary ½ thread, in length, on two thousand bolts. The machine is substantially built of the best quality of iron and steel, has four inch belt surface, with eighteen inch diameter of cone, cut gearing, wrought iron pinions, and all the *wearing parts* are made of *tempered steel.* The machine is now largely in use, and we offer it to the trade as one of the *most complete machinists' tools* in the market. We append a few certificates from parties who now have it in use.

HOWARD IRON WORKS:

Gentlemen:—After several months experience with your Automatic Revolving-Die Bolt Cutter, we cheerfully bear testimony to the superiority of the machine, it having more than met our anticipations, which were considerable, in view of the high claims you made for it.

Yours truly,

BUFFALO, Dec. 24th, 1875. PRATT & LETCHWORTH.

THE PITTS AGRICULTURAL WORKS.

BUFFALO, N. Y., Dec. 24th, 1875.

HOWARD IRON WORKS:

Gents:—We have given your Automatic Revolving-Die Bolt Cutter, a thorough test on all kinds of work, and have no hesitation in saying, that it combines more good qualities in one machine, than any we have ever used in our works. It is well adapted for all kinds of bolts, can be rapidly changed to any size, cuts a perfect thread in going over the bolt once, and does the work more rapidly than any machine in the market; a boy can operate and keep it in repair, and we regard it as the most complete machine, for the money, of any we have ever seen.

Yours, &c.,

ROB'T W. AITKEN, Foreman,

Pitts Agricultural Works.

MERRITON, Ont., April 13th, 1876.

HOWARD IRON WORKS:

Gents:—We consider the investment in the Bolt Cutter as amongst the best we ever made, and would not go back to the old method of cutting bolts for twice the cost of the machine, providing, we could not get another. In fact, it is indispensable, because it is profitable, and does its work so much better than any other machine.

We remain yours,

P. & J. PHELPS.

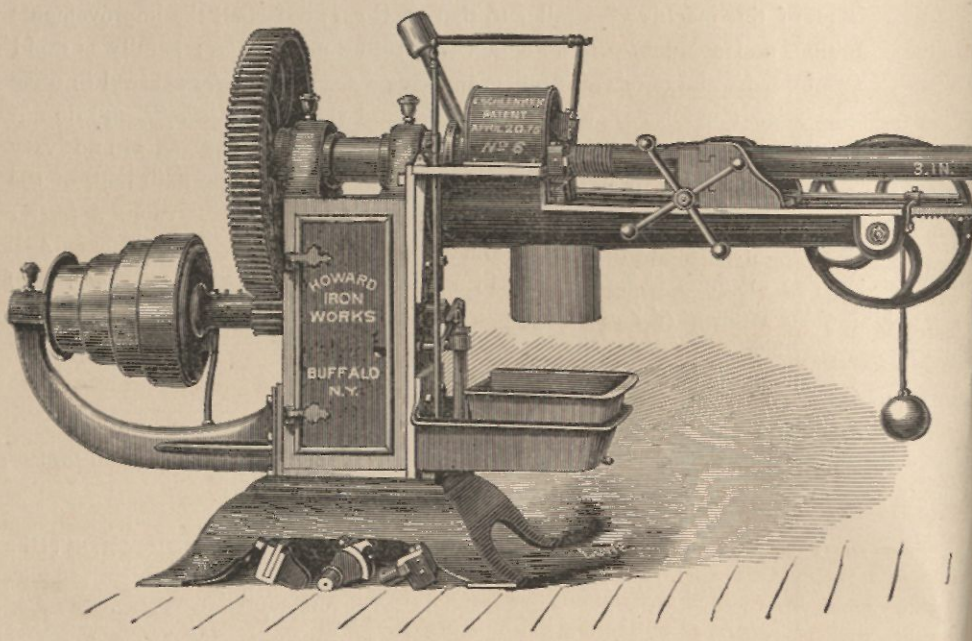
SCHLENKER'S AUTOMATIC

REVOLVING-DIE BOLT CUTTER

AND

NUT-TAPPING MACHINE.

No. 6



PATENTED APRIL 20th, 1875.

This machine will cut threads and tap nuts from 3/8 to 3 inches inclusive. We furnish with this machine: 18 sets Dies with steel Chucks, increasing by eighths, 18 Master Taps, 18 Nut Tap Holders, 3 Dies and steel Chucks for nut tapping, Counter-shaft complete, and steel Wrench.

Nut Taps are extra, and furnished at list prices, when ordered.

Price of Machine in Buffalo, - - - - - $760.00.

Boxing and cartage, extra.

Speed of Counter-shaft, from 175 to 200 revolutions per minute.

For extra Taps and Dies see next page.

Additional Dies will be furnished at the following prices:

Steel Chucks, with Dies cut, from 3/8 to 1 3/8 inches inclusive per set of 3,	$9.00
Blank Dies for same, per set of 3,	1.50
Steel Chucks, with Dies cut, from 1 3/8 to 1 3/4 inches inclusive, per set of 3,	11.00
Blank Dies for same, per set of 3,	2.50
Steel Chucks, with Dies cut, from 1 7/8 to 2 1/4 inches inclusive, per set of 3,	12.00
Blank Dies for same, per set of 3,	3.00
Steel Chucks, with Dies cut, from 2 1/2 to 3 inches inclusive, per set of 3,	14.00
Blank Dies for same, per set of 3,	4.00
18 Nut Taps, from 3/8 to 3 inches inclusive,	125.40

The working principle of this machine is the same as that of our Nos. 5 and 5½, although it differs somewhat from those machines in construction, with all the parts much *heavier* and *stronger*. The Dies are changed as readily, and it is fully as rapid a worker as the smaller machines, but is intended more particularly for large and heavy work. It has back gear, with seven different speeds, the slowest being 24 to 1, and the fastest 6 to 1, and is also supplied with a SCHLENKER PUMP for lubricating, which furnishes a *constant supply* of oil, as it is drained from the chips.

The accompanying letters are from firms who have our machines in constant use:

BUFFALO, N. Y., December 23d, 1875.

THE HOWARD IRON WORKS:

Gentlemen—We have in use one of Schlenker's Automatic Revolving-Die Bolt Cutters, and, in our opinion, it is all you claim for it in your circulars. The simplicity of its construction, together with its facilities for readily changing and adjusting the dies, the great variety of work to which it is adapted, together with the perfect cut of the thread, and its ease of action, render it one of the most perfect machines in the market. It has our hearty recommendation.

Yours, truly,

PLUMB, BURDICT & BARNARD.

Office of the GIBBS & STERRETT MANUF'G CO.

CORRY, PA., February 23d, 1876.

HOWARD IRON WORKS, Buffalo, N. Y.:

Gents—The Schlenker Revolving-Die Bolt Cutter, purchased from you, is giving perfect satisfaction. The facility with which the dies are changed, and the construction of adjustable jaws, admits bolts with chains, or large L or T head bolts, which in our Reaper Work is indispensable.

Since we have started this machine, we have stopped entirely the machines we had in use.

Yours, truly,

GIBBS & STERRETT MANUF'G CO.,

Geo. H. Gibbs, Superintendent.

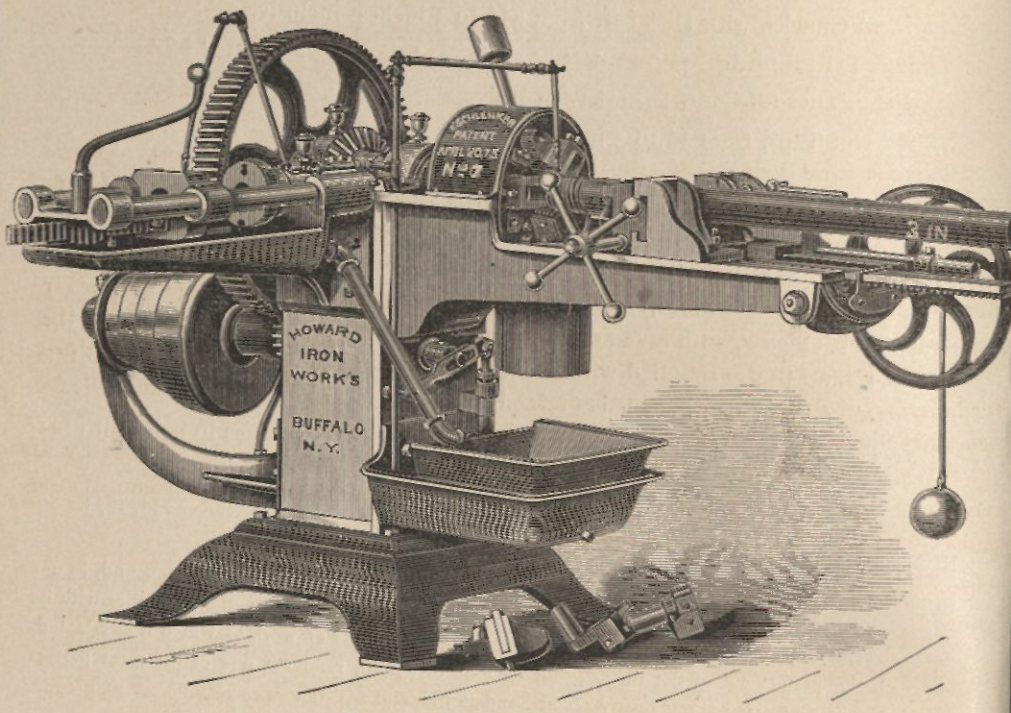
SCHLENKER'S AUTOMATIC

REVOLVING-DIE BOLT CUTTER

WITH

NUT-TAPPING COMBINATION.

No. 7.



Patented April 20th, 1875.

This machine will cut threads on bolts and tap nuts from ⅜ to 3 inches inclusive. We furnish with the machine 18 sets Dies, with steel Chucks, increasing by eighths, 18 Master Taps, 8 Nut Tap Holders, 3 Dies and steel Chucks for nut tapping, Counter-shaft complete, and steel Wrench. Nut Taps are extra, and furnished at list prices when ordered.

Price of Machine in Buffalo, - - - - $810

Boxing and cartage extra.

Speed of Counter-shaft from 175 to 200 per minute.

For extra Taps and Dies see next page.

We furnish additional Dies and Nut Taps as follows:

Steel Chucks with Dies cut from 3/8 to 1 1/4 inch inclusive, per set of three,	$ 9.00
Blank Dies for same, per set of 3,	1.50
Steel Chucks with Dies cut from 1 3/8 to 1 3/4 inches inclusive, per set of 3,	11.00
Blank Dies for same, per set of 3,	2 50
Steel Chucks with Dies cut from 1 7/8 to 2 1/4 inches inclusive, per set of 3,	12.00
Blank Dies for same, per set of 3,	3.00
Steel Chucks with Dies cut from 2 1/2 to 3 inches inclusive, per set of 3,	14.00
Blank Dies for same, per set of 3,	4.00
18 Nut Taps from 3/8 to 3 inches inclusive,	125.40

This machine is similar in construction to our No. 6; having the same *powerful Back Gear* with seven different speeds, the same arrangement for rapidly changing the Dies; and is also supplied with the same *lubricating pump.* It works as rapidly as the No. 6, and has, in addition to all the improvements of that machine, a *Nut-Tapping Combination*, giving virtually *two machines in one*, which enables the operator to tap nuts from 3/8 to 1 1/2 inches inclusive, at the same time the thread is being cut on the bolts; which is a large *saving of time* on all bolts, less than 1 1/2 inches diameter. Nuts for bolts larger than 1 1/2 inches in diameter are cut on the main spindle, and all the necessary apparatus is furnished with the machine.

This machine is regarded by parties who have it in use as the MOST POWERFUL and COMPLETE Bolt Cutter in the market. We give below certificates from some of the parties who have given it a thorough trial on all kinds of work.

OFFICE OF LEHIGH VALLEY RAIL ROAD COMPANY,
WEATHERLY SHOPS, PA., March 29th, 1876.

R. L. HOWARD, Esq., Howard Iron Works, Buffalo, N. Y.,

Dear Sir:—Yours of the 21st received; and in reply would say that we consider the Schlenker Bolt Cutter a good machine, and it has given us satisfaction. The Cutter-Heads should always be of steel, (they are, when made of iron, often broken). The steel ones you had made and sent us to replace the iron ones, have given us entire satisfaction.

Yours truly,
PHILIP HOFECKER,
Master Mechanic,

The above letter is from parties who have in use the first machine of this size we made; and we now make all our machines with steel Chucks to hold the Dies.

TOLEDO, January 24th, 1876.

HOWARD IRON WORKS:

Gents:—I have in use one of your Schlenker Automatic Revolving-Die Bolt Cutters, and am well pleased with the machine in all respects. It is a rapid worker, very simple in construction, can be almost instantly changed to any size, cuts a perfect and clean thread with once going over the bolt, and is well adapted to all kinds of bolts, crooked as well as straight. I regard it as the best machine in the market, and cheaper in price than any machine that will cut the same sizes. I would recommend it for jobbing shops.

Respectfully yours,
JONATHAN SMITH.

WE desire to call the attention of the trade to the superiority of the Schlenker Automatic Revolving-Die Bolt Cutters, over any other machine in the market, in the following respects:—

The action of the dies, in these Bolt Cutters, is the same as a lathe tool, taking a clean chip, and leaving a strong, perfect thread, with one passage of the die over the bolt.

They are opened automatically.

They are much cheaper.

They can be ground when dull.

They can be re-cut many times.

They can be changed instantly, without removing screw, bolt or pin.

They save the running back off the thread.

They have a good lubricating arrangement.

They will cut square threads, coach screws, and V threads.

Threads cut by these machines will not vary half a thread in length on ten thousand bolts.

These machines can be operated by any boy who can read figures.

They have cut gearing with wrought iron pinion.

They have all the wearing parts of steel and tempered.

They have less parts than any other machine.

They strain the oil from the chips.

They take up very little room.

They are not liable to get out of order.

They are geared very powerfully.

They have large bearing and wearing surfaces.

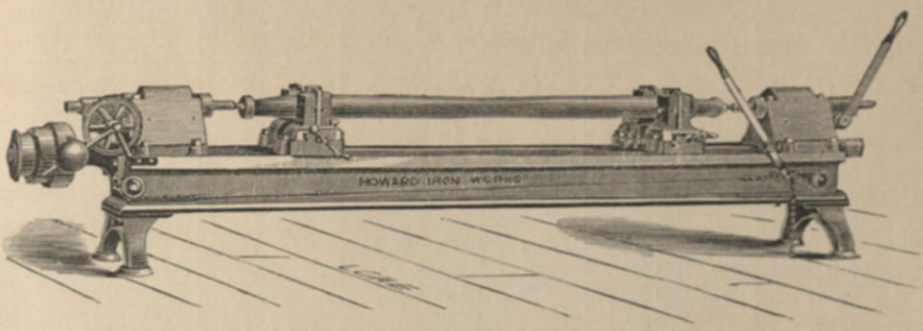
They will take in crooked work as well as straight.

They will tap nuts as well as cut threads on bolts.

They will cut all their bolts uniform.

The inventor has had great experience, and it has been his aim to invent and give to the world the *best* and *cheapest* Bolt Cutter. That he has succeeded in doing so, is the universal testimony of all who have them in use. No case has come to our knowledge in which the parties have been dissatisfied with their purchase, or in which the machine has failed to work satisfactorily on any size or length of bolt. See testimonials on other pages.

HOWARD CENTERING LATHE.



Price on Board Cars, - - - $400.

Above is an illustration of our Centering Lathe, which is now in general use in the largest railroad shops, forges and car works. It will be found a *very expeditious* and *accurate* tool for centering car axles and shafting, at both ends at the *same time*. Is adapted to any length of shaft, and any size up to six inches in diameter. The price quoted above is for size suitable for any length of car axle.

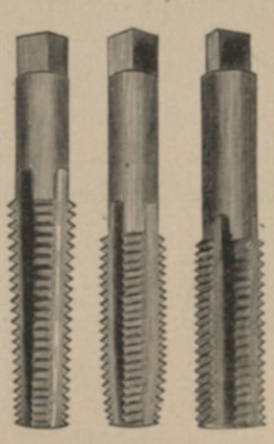
SETS OF MACHINISTS' HAND TAPS.

V OR FRANKLIN INSTITUTE SHAPE OF THREAD.

Unless advised to the contrary, we fill orders with V Threads.

3 Taps to set—Taper, Plug and Bottoming.

Diameter.	No. Threads to inch.	Price each.	Price per set.
1-4	16, 18 & 20	$0 45	$1 35
5-16	16 & 18	50	1 50
3-8	14, 16 & 18	55	1 65
7-16	14 & 16	60	1 80
1-2	12, 13 & 14	70	2 10
9-16	12 & 14	80	2 40
5-8	10, 11 & 12	90	2 70
11-16	11 & 12	1 05	3 15
3-4	10, 11 & 12	1 20	3 60
13-16	10	1 40	4 20
7-8	9 & 10	1 60	4 80
15-16	9	1 80	5 40
1	8	2 00	6 00
1 1-8	7 & 8	2 25	6 75
1 1-4	7	2 60	7 80
1 3-8	6	3 00	9 00
1 1-2	6	3 50	10 50
1 5-8	5 & 5½	4 20	12 60
1 3-4	5	5 00	15 00
1 7-8	4½ & 5	5 80	17 40
2	4½	6 70	20 10



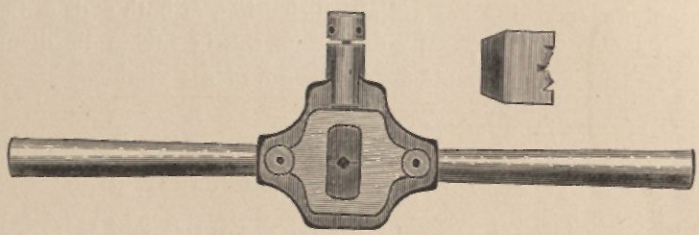
TAPER. PLUG. BOTTOMING.

We keep in stock the above—$\frac{1}{32}$ over size—and make them to order without extra charge $\frac{1}{64}$ or $\frac{1}{100}$ full.

TAPS FOR MACHINE SCREWS.

Diameter.	Wire Gauge Size.	No. Threads to inch.	Price each.	Price per doz.
7-64	No 4	36 & 40	.35	4.00
9-64	" 6	30, 32, 36 & 40	.35	4.00
1-8	" —	30, 32, 36 & 48	.35	4 00
5-32	" 8	30 & 32	.35	4.00
3-16	" 10	20, 22 & 24	.35	4.00
7-32	" 12	20, 22 & 24	.35	4.00
1-4	" 14	16, 18, 20, 22 & 24	.38	4 40
17-64	" 16	16, 18, 20 & 22	.38	4 40
9-32	" 18	16, 18 & 20	.38	4 40
5-16	" 20	16, 18 & 20	.45	5.30
3-8	" 24	14, 16 & 18	.45	5 30

All orders for less than half dozen of a size at single price.



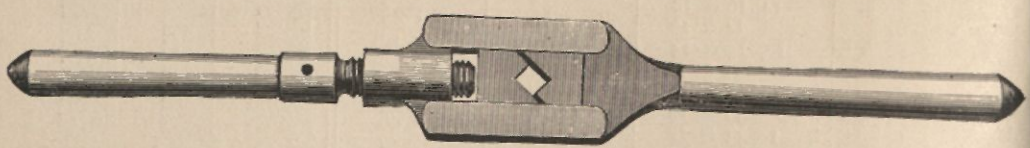
No. 1 SCREW PLATE AND DIES.

For the use of Model Makers and Jewelers, cutting $\frac{1}{8}$ 48, $\frac{5}{32}$ 40, $\frac{3}{16}$ 32, $\frac{7}{32}$ 24, $\frac{1}{4}$ 20.

Price :—No. 1 Screw Plate, with 5 pair of Dies and 5 Taps, - - $5 25

Single pair of Dies, 50 cents each.

The above set complete, including Plate, Dies, Taps and Adjustable Wrench, 7.25



PATENT ADJUSTABLE TAP WRENCH.

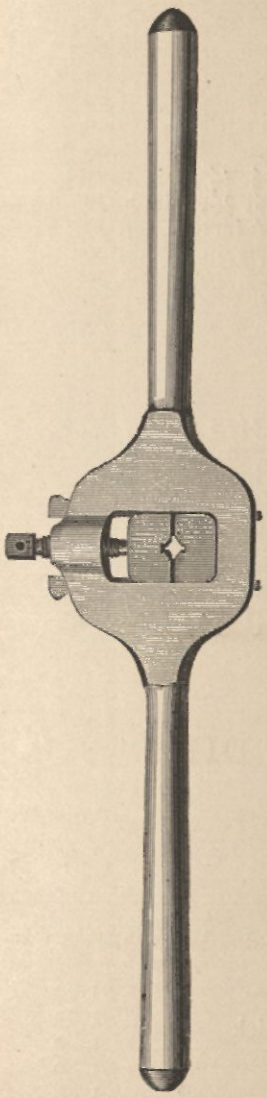
Fitting Taps from $\frac{1}{8}$ to $\frac{1}{4}$, inclusive, - - - - - $2 25

A { Fitting Taps from $\frac{1}{4}$ to $\frac{5}{8}$, inclusive, - - - - - } 3.00
{ " Reamers from $\frac{1}{4}$ to $\frac{13}{16}$, inclusive, - - - - - }

B { Fitting Taps from $\frac{1}{2}$ to 1, inclusive, - - - - - } 4.00
{ " Reamers from $\frac{3}{8}$ to 1, inclusive, - - - - - }

C { Fitting Taps from $\frac{7}{8}$ to $1\frac{1}{4}$, inclusive, - - - - - } 5.00
{ " Reamers from $\frac{11}{16}$ to $1\frac{5}{16}$, inclusive, - - - - - }

SCREW PLATES.



PRICE SCREW-PLATES

WITHOUT DIES.

Size A, $3.25; B, $4 00; C, $5.00; D, $6.00.

PRICE SCREW-PLATES.

Size A, with 3 pair Dies, cutting	$\frac{1}{4}^{20}$,	$\frac{3}{8}^{16}$,	$\frac{1}{2}^{12}$,	$5.00
" B, " 4 "	"	$\frac{3}{8}^{16}$,	$\frac{1}{2}^{12}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$,	8 00
" C, " 4 "	"	$\frac{1}{2}^{12}$,	$\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$,	10 00
" D, " 4 "	"	$\frac{7}{8}^{9}$,	1^{8}, $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$,	13 00

Dies extra as below.

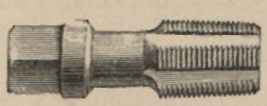
Single Dies, Size A,	$1.00
" " B,	1.25
" " C,	1 75
" " D,	2.00

Screw plates can have the following sizes of Dies with threads as on page 31.

Size A,	¼ to ⅝
" B,	¼ to ⅞
" C,	⅜ to 1
" D,	$\frac{13}{16}$ to 1½

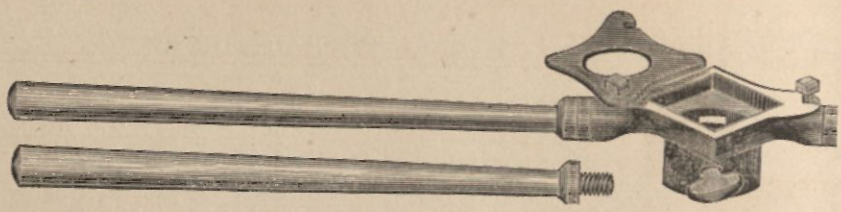
Our Patent Screw-Plates are of an improved pattern and finish. They are light and durable, and have recently been so perfected as to admit of a change of Die most quickly. The Dies and Plates are carefully finished to standard gauges, and both are warranted as to accuracy of size. The Dies are carefully tempered

PIPE TAPS AND REAMERS.



Price,	$1.12	1.25	1.50	1.87	2.50	3.12	3.75	4.62	6.25	10.50	15.00
Diameter,	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3 in.

PIPE STOCKS AND DIES WITH BUSHINGS.

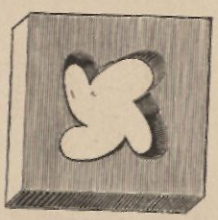


No. 1,	Solid Plate and Guides	cutting 1/8, 1/4, 3/8, 1/2 inch	$ 8.00
No. 2,	Screw Plate, Solid Dies	" 1/4, 3/8, 1/2, 3/4, 1 inch	14.00
No. 3,	" " "	" 3/4, 1, 1 1/4 inch	14 00
No. 4,	" " with Driving Screw	" 1 1/4, 1 1/2, 2 inch	20.00
No. 5,	" " " " "	" 2 1/2, 3 inch	40.00

SOLID PIPE DIES.

No. 2,	2 1/4 inch Square R. or L. Size	1/4, 3/8, 1/2, 3/4, 1 inch	$ 1.80
No. 3,	3 " " " "	3/4, 1, 1 1/4 inch	2.35
No. 4,	3 3/4 " " " "	1 1/4, 1 1/2, 2 inch	3.30
No. 5,	5 " " " "	2 1/2, 3 inch	9.00
No. 6,	7 " " " "	3 1/2, 4 inch	25 00

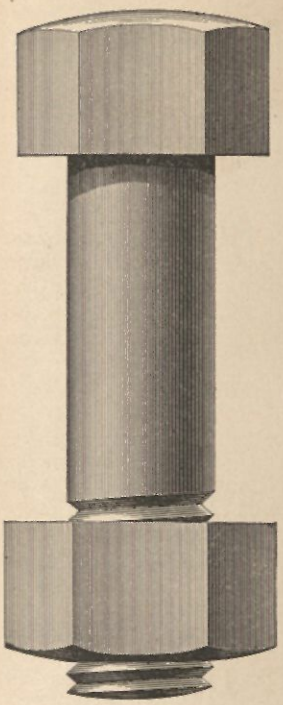
MACHINE OR SOLID BOLT DIES.



Diameter.	No Threads to Inch.	Size of Square.	Price, each.
1-4	20	2 1-2	$1.80
5-16	18	2 1-2	1.80
3-8	16	2 1-2 } 1-2 inch thick.	1.80
7-16	14	2 1-2	1.80
1-2	12	2 1-2	1.80
5-8	11	2 1-2	2.00
3-4	10	2 1-2 } 3-4 inch thick.	2.20
7-8	9	2 1-2	2.40
1	8	2 1-2	2.70
1 1-8	7	2 1-2	3.00
1 1-4	7	2 1-2	3.30
1 3-8	6	2 1-2 } 1 inch thick.	3 60
1 1-2	6	2 1-2	3.90
1 5-8	5 1-2	3	4.20
1 3-4	5	3	5.40
1 7-8	5	3 & 1 1-4 thick.	6.50
2	4 1-2	3 1-2 & 1 1-2 "	7.50
		3 3-4 & 2 "	

The above are kept in stock—by sixteenths and thirty-seconds to 1 inch; by eights and thirty-seconds from 1 inch to 1 1-2 inch.

COUPLING BOLTS.



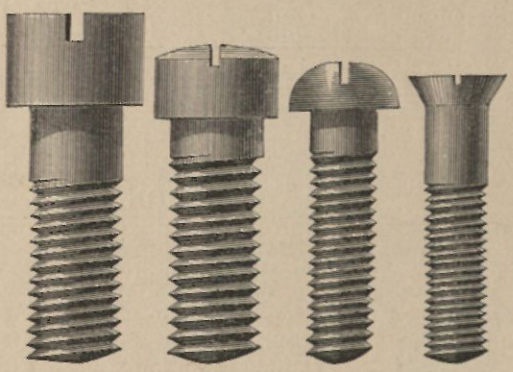
Diam.	Length.	Price.	Diam.	Length.	Price.
5/8 in.	2½ in.	$ .22	¾ in.	3½ in.	$ .32
	3 "	.25	1 "	3 "	.60
¾ "	3 "	.30		3½ "	.63

Finished Heads and Case-Hardened Nuts, 20 per cent. extra.

STEEL DOG SCREWS.

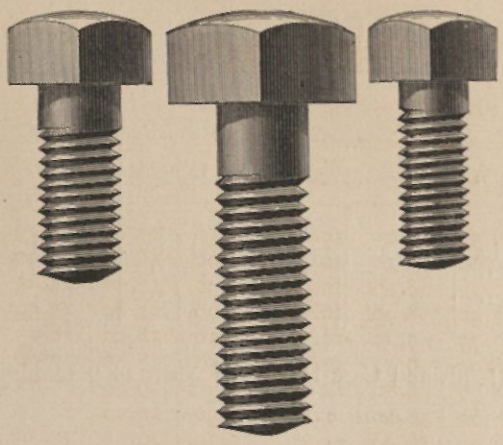
Ten per cent. advance from List of Steel Set Screws.

MACHINE OR CAP SCREWS.



ROUND HEAD.—Per 100.

Diameter of Head,	3-16	9-32	11-32	15-32	19,32	23,32	13-16	7-8	15-16
Length of Head,	⅛	5-32	3-16	¼	5-16	7-16	1-2	9-16	5-8
No. Thread to in.,	36, 40	24,26,28	18, 20	18, 20	16-14	14	12,13,14	12	10,11,12
Diameter of Screw,	⅛	3-16	¼	5-16	⅜	7-16	½	9-16	⅝
¾	2.00	2.25	2.75	3.30	3.85	4.40	5.50		
1	2.25	2.50	3.00	3.57	4.12	4.67	5.83	7.25	
1¼	2.50	2.75	3.30	3.85	4.40	4.95	6.15	7.60	9.90
1½	2.75	3.00	3.57	4.12	4.67	5.22	6.50	7.90	10.45
1¾			3.85	4.40	4.95	5.50	6.82	8.25	11.00
2			4.12	4.67	5.22	5.77	7.15	8.60	11.55
2¼				4.95	5.50	6.05	7.48	8.90	12.10
2½					5.77	6.32	7.84	9.25	12.65
2¾						6.60	8.14	9.57	13.20
3							8.47	9.90	13.75



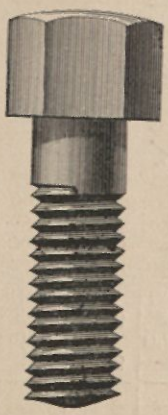
MACHINE OR CAP SCREWS.

SQUARE HEAD.—Price Per 100.

Diam. Head,.....	3/8	7-16	1/2	9-16	5/8	11-16	3/4	7-8	1	1 1/8
No. of Threads,.....	18, 20	18, 20	16-14	14	12,13,14	12	10,11,12	10-11	9	8-9
Diam. Screws,.....	1/4	5-16	3/8	7-16	1/2	9-16	5/8	3-4	7-8	1
Length under Head.										
3/4	2.42	2.75	3.20	3.75	4.40					
1	2.58	2.90	3.40	3.95	4.67	5.50				
1 1/4	2.75	3.08	3.62	4.18	4.95	5.77	7.70			
1 1/2	2.90	3.25	3.85	4.40	5.22	6.05	8.25	9.50	12.76	16.56
1 3/4	3.08	3.40	4.06	4.62	5.50	6.32	8.80	10.00	13.97	17.40
2	3.25	3.57	4.28	4.84	5.77	6.60	9.35	10.50	14.08	18.24
2 1/4		3.75	4.50	5.06	6.05	6.87	9.90	11.00	14.74	19.08
2 1/2			4.72	5.28	6.32	7.15	10 45	11.50	15.34	19.78
2 3/4				5.50	6.60	7.42	11.00	12.00	15.94	20.48
3					6.87	7.70	11.55	12.50	16.54	21.18

Extra Large Sized Heads, Extra Price.

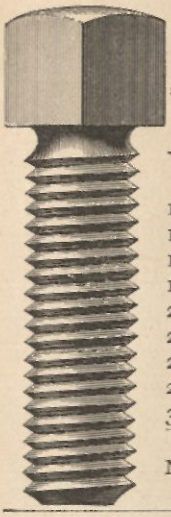
HEXAGON HEAD.—Price Per 100.



Diam. Head,.....	9-16	9-16	9-16	9-16	3/4	13-16	7-8	1	1 1/8	1 1/4
No. of Threads to in.,	18,20	18,20	16.14	14	12,13,14	12	10,11,12	10-11	9	8-9
Diam. Screw,.....	1/4	5-16	3/8	7-16	1/2	9-16	5/8	3-4	7-8	1
Length under Head.										
3/4	2.64	3.08	3.57	4.12	4.84					
1	2.86	3.30	3.85	4.40	5.17	6.16				
1 1/4	3 08	3.52	4.12	4 67	5.50	6.50	8.25			
1 1/2	3.30	3.74	4.40	4 95	5.83	6.82	8.80	12.00	16.92	21.06
1 3/4	3 52	3.96	4.67	5.22	6.16	7.15	9.35	12.50	17.64	22.00
2	3.79	4.18	4.95	5.50	6 50	7.48	9.90	13.00	18.36	22.94
2 1/4		4.40	5.22	5.77	6.82	7.80	10.45	13.50	19.08	23.88
2 1/2			5.50	6.05	7.15	8.14	11.00	14.00	19 83	24.60
2 3/4				6.32	7.48	8.47	11.55	14.50	20.58	25.40
3					7.80	8.80	12.10	15.00	21.33	26.20

N. B —Finished Heads of Square or Hexagon Head. Cap Screws, 15 per cent. more.

N. B —We wish to call the attention of Machine manufacturers to our unrivaled Machine Screws, made from a superior quality of Iron, and cut to standard Gauges.



STEEL SET SCREWS.

TEMPERED.—PER 100.

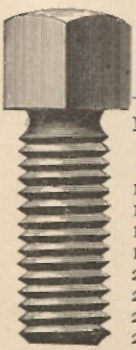
SIZE.	¼	5/16	⅜	7/16	½	9/16	⅝	¾
¾ inch...	5.70	6.10	6 50	8.00	10.00	12.50	16.00	22.75
1 " ...	6.00	6.40	6.80	8.30	10.30	12 90	16.60	23.50
1¼ " ...	6.30	6.70	7.10	8.60	10 60	13.30	17.20	24.25
1½ " ...	6.60	7.00	7.40	8.90	10.90	13.70	17.80	25.50
1¾ " ...	6.90	7.40	7.70	9.20	11.20	14.10	18.20	26.25
2 " ...	7.20	7.80	8.00	9.50	11.50	14.50	18 80	27 00
2¼ " ...	7.50	8.20	8.30	9.80	11.80	14.90	19.40	27.75
2½ " ...	7.80	8.60	8.60	10.10	12.10	15.30	20.00	28.50
2¾ " ...	8.10	8.90	8.90	10.40	12.40	15.70	20.60	29.25
3 " ...	8.40	9.20	9.20	10.70	12.70	16.10	21.20	30.00
No. Threads.	24	20	16	14	12 and 13	12	11 and 12	10

N. B.—We keep on hand all our standard sizes with cupped points only. Oval or conical points made as ordered.

Lengths given under head to point.

IRON SET SCREWS.

PER 100.



No. Threads to in.	18-20	16-18	16	14	12-13 14	12	10-11 12	10-11	9	8-9
Diameter of Screw.	¼	5-16	⅜	7-16	½	9-16	⅝	3-4	7-8	1
Length under Head.										
¾	2.20	2.40	2.75	3.20	3.75					
1	2.36	2.60	2.90	3.40	3.97	4.67	5.50			
1¼	2.53	2.75	3.10	3.60	4.18	4.95	5.76			
1½	2.70	2.90	3.25	3.80	4.40	5.22	6.05	7.50	10.45	13.34
1¾	2.85	3.10	3.40	4.00	4.62	5.50	6.32	8.00	11.00	15.76
2	3.00	3.25	3.55	4.25	4.84	5.76	6.60	8.50	11.55	18.17
2¼		3.40	3.75	4.50	5.06	6.05	6.87	9.00	12.10	20.60
2½			3.90	4.75	5.28	6.32	7.15	9.50	12.70	21.30
2¾				5.00	5.50	6.60	7.42	10.00	13.30	22.00
3					5.72	6.87	7.70	10.50	13.90	22.70

Case-Hardening, ten per cent. Extra.

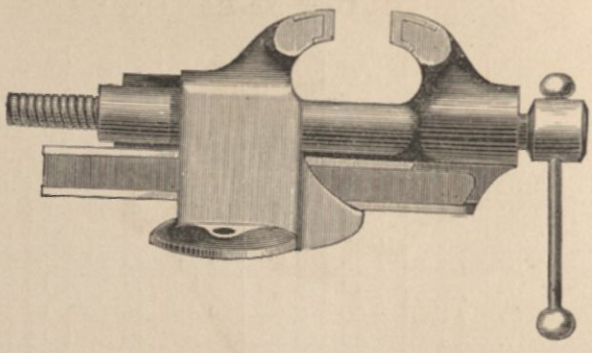
Iron Set Screws of standard sizes usually kept on hand with both cupped and oval points.

N. B.—Please state when ordering, whether cupped or oval points.

Lengths given under head to point.

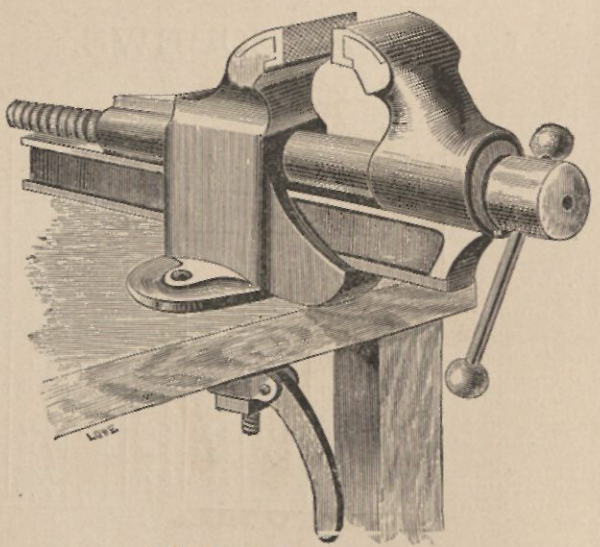
HOWARD PARALLEL BENCH VISE.

(NEW STYLE.)



FIXED.

No. 20,	2 inch Jaw	$ 4.00
No. 25,	2½ "	5.00
No. 30,	3 "	6.25
No. 35,	3½ "	7.00
No. 40,	4 "	9.00
No. 45,	4½ "	11.75
No. 50,	5 "	16.25
No. 55,	5½ "	20.00
No. 60,	6 "	24.00



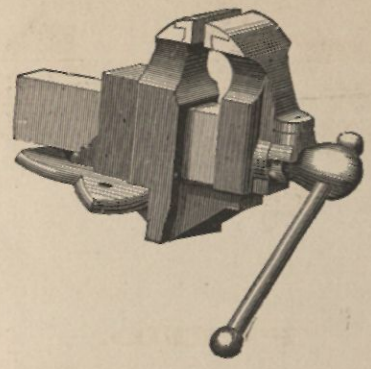
SWIVEL.

No. 20,	2 inch Jaw	$ 4.50
No. 25,	2½ "	5.75
No. 30,	3 "	7.00
No. 35,	3½ "	8.25
No. 40,	4 "	10.75
No. 45,	4½ "	14.00
No. 50,	5 "	19.25
No. 55,	5½ "	23.50
No. 60,	6 "	28.50

BOXING AND CARTAGE EXTRA.

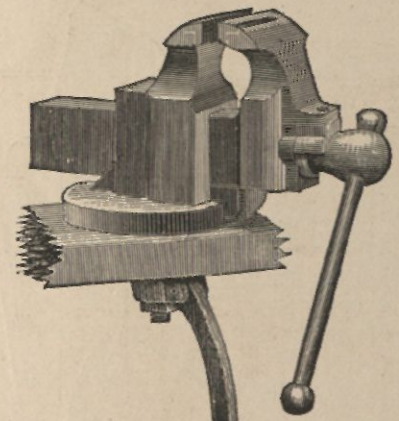
HOWARD PARALLEL BENCH VISE.

(OLD STYLE.)



FIXED.

No. 0,	Length of Jaw,	3	inches,	weight,	25½	lbs	$	5.50
No. 1,	" "	3½	"	"	31½	"		6.50
No. 2,	" "	4	"	"	41	"		8.50
No. 3,	" "	4½	"	"	52½	"		10.75
No. 4,	" "	5	"	"	93	"		16.00
No. 5,	" "	6	"	"	113½	"		23.75
No. 6,	" "	7	"	"	184	"		34.50

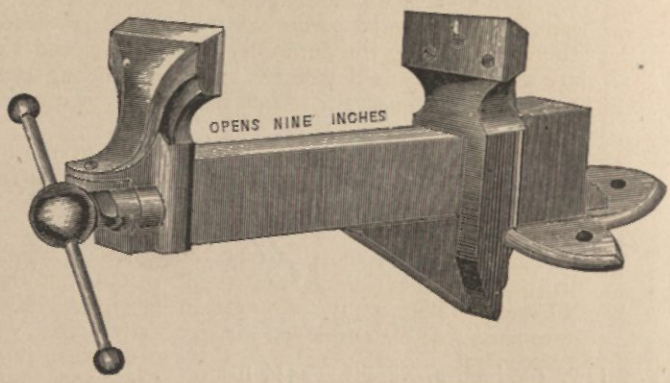


SWIVEL.

No. 00,	Length of Jaw,	2	inches,	weight,	7½	lbs	$	4.00
No. 0,	" "	3	"	"	31½	"		6.25
No. 1,	" "	3½	"	"	38½	"		8.00
No. 2,	" "	4	"	"	48	"		10.00
No. 3,	" "	4½	"	"	61	"		13.25
No. 4,	" "	5	"	"	104½	"		18.50
No. 5,	" "	6	"	"	129	"		26.00
No. 6,	" "	7	"	"	194	"		36.00

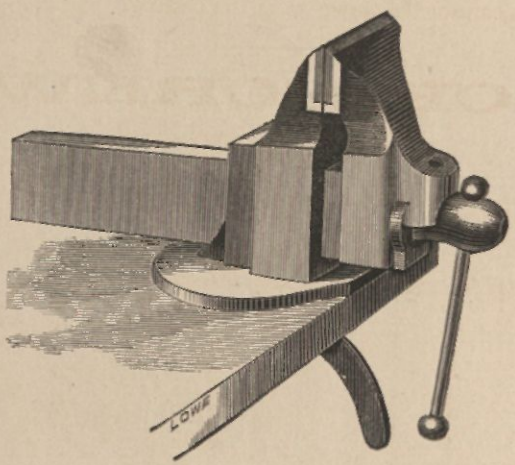
BOXING AND CARTAGE EXTRA.

HOWARD COACH MAKERS' VISE.



FIXED.

No. 2, Length of Jaw, 4 inches, Weight, 37½ lbs. $10.0



SWIVEL.

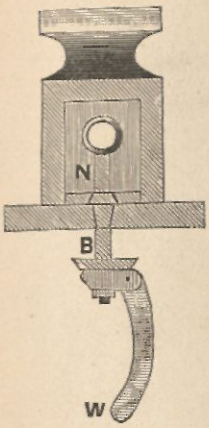
No. 1, Length of Jaw, 4 inches $12.5

BOXING AND CARTAGE EXTRA.

EXPLANATION

OF THE

CONSTRUCTION OF THE HOWARD VISE.



The accompanying cut shows the Malleable Nut, Back Jaw, and Cam of the Swivel Vise.

The style is acknowledged to be excellent. The malleable cast iron nut is rendered *immovable* by being set in the molten iron, thereby doubling the durability of both nut and screw, for they are saved from the destructive grinding, cutting and bending action of the cross-strain, which has always been a great evil heretofore.

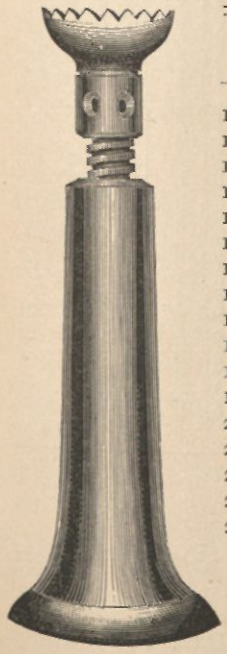
Another improvement is the chilling of those parts of the slide sheath that come in contact with the slide, thereby avoiding much friction in its movements.

These improvements apply to all of our Vises; but additional and great improvements have been made in the *Swivel Vise*, which, in the opinion of many, must result in its being the favorite for all uses. There is great strength in its circular base, so that its side parts may be employed for light anvil uses, which is often convenient. In the centre of this base, as seen in the cut, is set, at the time of its being cast, the strong bolt, B; the nut of this bolt, under the bench, is brought to its desired position on the bolt by the cam wrench C, W; the handle W, is now forced down, and the cam, acting upon the short lever between the nut and washer, exerts its very great and *duplicated* power in holding the Vise securely. So firmly does it hold it, that the combined force of several men exerted upon the Vise cannot move it from its position. And yet so convenient is the little machine that this great power is instantly removed and applied.

The seat of the swivel is slightly concave, so that it shall rest upon the circumference of its base. Let it be observed that the nut of the bolt, B, is not turned in the least when the strain is upon it, and so the thread is saved from wear. The bolt is so formed and set that it cannot be drawn from the casting.

JACK SCREWS.

BELL BOTTOM.

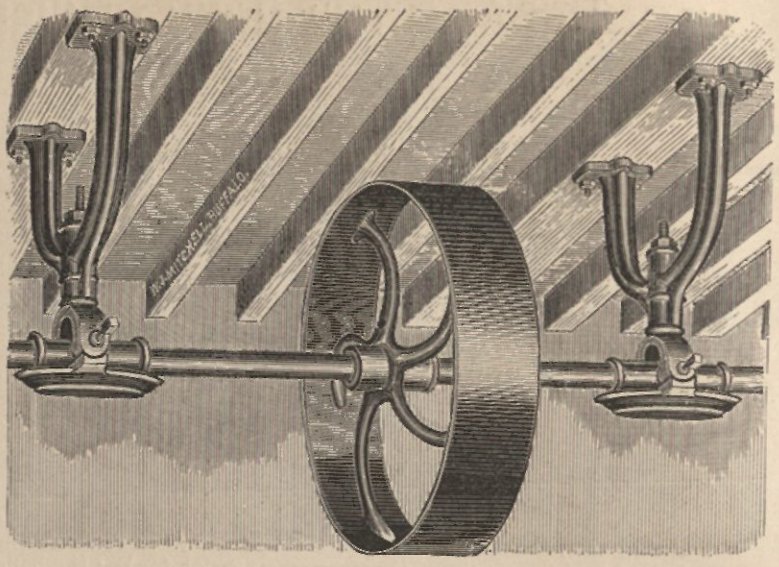


Diameter.	Length of Iron Barrel.	Price.	Diameter.	Length of Iron Barrel.	Price.
1¼ inches.	6 inches.	$2.50	2 inches.	16 inches.	$7.00
1¼ "	8 "	3.00	2 "	20 "	8.00
1½ "	6 "	3.00	2 "	24 "	10 00
1½ "	8 "	3.50	2¼ "	8 "	6.50
1½ "	10 "	3.75	2¼ "	10 "	7.00
1½ "	12 "	4.00	2¼ "	12 "	7.50
1¾ "	6 "	3.25	2¼ "	14 "	8.00
1¾ "	8 "	3.75	*2¼ "	16 "	9.00
1¾ "	10 "	4 00	*2¼ "	20 "	10.00
1¾ "	12 "	4.50	*2¼ "	24 "	12.00
1¾ "	14 "	4.75	*2½ "	8 "	7.50
1¾ "	16 "	5.90	*2½ "	10 "	8.00
2 "	6 "	4.00	*2½ "	12 "	8.50
2 "	8 "	4.25	*2½ "	14 "	9.00
2 "	10 "	4 75	*2½ "	16 "	9.50
2 "	12 "	5.25	*2½ "	20 "	11.00
2 "	14 "	6.00	*2½ "	24 "	13.00

Handles extra.

NOTE.—The sizes designated above by a star, thus (*2¼), are adapted for Locomotives.

PLAIN PULLEYS.



Diam.	Face.	Price.	Diam.	Face.	Price.	Diam.	Face.	Price.	Diam.	Face.	Price.	Diam.	Face.	Price.	Diam.	Face.	Price.
6	2	1.47	12	10	6.30	22	4	6.23	28	16	28.70	36	12	28.20	44	16	49.22
	4	1.83		12	7.44		6	8.12	30	4	10.05		14	32.62	46	6	24.78
	6	2.27		14	7.98		8	10.05		6	13.13		16	36.12		8	29.33
	8	2.94	14	4	4.18		10	12.08		8	15.18	38	6	18.90		10	35.49
	10	3.47		6	5.09		12	14.53		10	17.30		8	23.10		12	41.58
	12	3.90		8	6.16		14	16.38		12	23.66		10	27.23		14	47.34
7	2	1.68		10	7.56	24	4	6.72		14	27.00		12	31.43		16	53 20
	4	2.17		12	8.82		6	8.78		16	32.06		14	35.56	48	10	37.25
	6	2.80		14	9.93		8	10.87	32	4	10.89		16	39.69		12	43.89
	8	3.43	16	4	4.62		10	13.16		6	14.30	40	6	21.25		14	50.56
	10	3.92		6	5.74		12	15.47		8	18.32		8	24.54		16	56.98
	12	4.55		8	7.07		14	17.57		10	21.79		10	28.57	54	12	72.10
8	2	1.93		10	8.54		16	20.58		12	25.74		12	33.79		16	81.53
	4	2.35		12	9.96	26	4	8.12		14	29.96		14	37.54	60	12	80.27
	6	3.01		14	11.15		6	10.58		16	33.57		16	42.39		14	92.19
	8	3.92	18	4	5.11		8	12.67	34	4	11.69	42	6	21.81		16	110.36
	10	4.48		6	6.59		10	15.78		6	15.41		8	25.69		18	123.90
	12	5.20		8	7.63		12	19.00		8	19.34		10	30.33	66	12	92.96
10	2	2.38		10	9.66		14	22.61		10	23.21		12	35.07		14	104.07
	4	3.22		12	11.45		16	25.34		12	26.92		14	39.76		16	122.97
	6	3.92		14	12.88	28	4	9.05		14	31.29		16	44.94		18	138.19
	8	4.76	20	4	5.81		6	12.15		16	34.77	44	6	23.03	72	12	107.94
	10	5.40		6	7.28		8	13.87	36	4	12.46		8	27.98		14	117.23
	12	6.25		8	9.24		10	16.60		6	16.59		10	33.36		16	133.86
12	4	3.65		10	11.27		12	20.58		8	21.14		12	39.15			
	6	4.62		12	12.89		14	25.49		10	24.92		14	43.69			
	8	5.20		14	14.74												

In ordering Pulleys, parties should always state whether a loose or tight Pulley is desired, as we use a different hub for each kind.

Prices given, on application, for larger and heavier Pulleys of all sizes up to 12 feet diameter. Extra is charged for Split Pulleys, according to size.

A LIBERAL DISCOUNT ON LARGE ORDERS.

UNIVERSAL DROP HANGER.

WITH OIL DISH.

Size of Shaft to take in.	Length of Iron Box.	Drop in Inches.	Spread of Legs.	Price.
1 1-2 inch.	7 inch.	16 1-2 inch.	22 inch.	$5.50
1 3-4 "	8 "	16 1-2 "	22 "	5.75
2 "	8 "	16 1-2 "	22 "	6 00
2 1-4 "	9 "	16 1-2 "	22 "	6.25
2 1-2 "	10 "	16 1-2 "	22 "	6 50
1 1-2 "	7 "	21 1-2 "	24 "	6.00
1 3-4 "	8 "	21 1-2 "	24 "	6 25
2 "	8 "	21 1-2 "	24 "	6,50
2 1-4 "	9 "	21 1-2 "	24 "	6 75
2 1-2 "	10 "	21 1-2 "	24 "	7 00

The above Hangers are Solid Pipe Boxes.

UNIVERSAL DROP HANGER.

WITH OIL DISH.

Size of Shaft to take in.	Length of Iron Box.	Drop, in Inches.	Spread of Legs.	Price.
2 inch.	8 inch.	22 1-2 inch.	24 inch.	$ 7 00
2 1-4 "	9 "	22 1-2 "	24 "	7.25
2 1-2 "	10 "	22 1-2 "	24 "	7 50
2 "	8 "	25 "	25 "	7.75
2 1-4 "	9 "	25 "	25 "	8.00
2 1-2 "	10 "	25 "	25 "	8.25
2 3-4 "	11 "	25 "	25 "	8.50
3 "	12 "	25 "	25 "	8.75
3 1-4 "	13 "	25 "	25 "	9.00
3 1-2 "	14 "	25 "	25 "	9.25
2 "	8 "	28 "	30 "	10.00
2 1-4 "	9 "	28 "	30 "	10.50
2 1-2 "	10 "	28 "	30 "	11.00
2 3-4 "	11 "	28 "	30 "	11.50
3 "	12 "	28 "	30 "	12.00
3 1-4 "	13 "	28 "	30 "	12 50
3 1-2 "	14 "	28 "	30 "	13.00
2 "	8 "	37 "	44 "	14.00
2 1-4 "	9 "	37 "	44 "	15 00
2 1-2 "	10 "	37 "	44 "	16.00
2 3-4 "	11 "	37 "	44 "	17 00
3 "	12 "	37 "	44 "	18.00
3 1-4 "	13 "	37 "	44 "	11.00
3 1-2 "	14 "	37 "	44 "	20.00

POST HANGERS.

Size.	Price	From Post to centre of Shaft.
1 1-4	$ 3.54	8 inches.
1 1 2	3.78	
1 5-8	4.20	
1 3 4	5 00	
1 7-8	6 04	
2	6.25	
2 1-8	6 40	
2 1-4	6.72	
2 3 8	9.05	
2 1-2	9.69	
2 5-8	10 29	
2 3-4	10 44	
2 7-8	12 18	
3	13 02	
3 1-4	17 22	12 inches.
3 1-2	19.64	
3 3-4	26.18	
4	27.44	
4 1-2	44 15	

All the above Hangers are made with Half Boxes and Oil Dish

A LIBERAL DISCOUNT ON LARGE ORDERS.

LOOSE COLLARS.

WITH SET SCREWS.

Diameter.	Price.	Diameter.	Price.
1 inch Collar,	$ .62	2⅜ inch Collar,	$2 22
1⅛ "	.64	2½ "	2.41
1¼ "	.69	2⅝ "	2.68
1⅜ "	.75	2¾ "	2.84
1½ "	.84	2⅞ "	2 96
1⅝ "	.98	3 "	3.24
1¾ "	1.18	3¼ "	3.45
1⅞ "	1.40	3½ "	3.78
2 "	1.66	3¾ "	4.15
2⅛ "	1.82	4 "	4.68
2¼ "	2.00		

COUNTER-SHAFT HANGER.

WITH IRON SHIPPER ARM, AND OIL DISH.

Size of Shaft to take in.	Length of Iron Box.	Drop, in Inches.	Spread of Leg.	Price.
1⅛	4	11	15	$2.00
1¼	5	11	20	2.50
1½	6	11	20	3.00
1¾	7	11	20	3.50
1¼	5	14	23	4.00
1½	6	14	23	4.50
1¾	7	14	23	5.00

The above Hangers are Solid Pipe Boxes.

TURNED DRILLS.

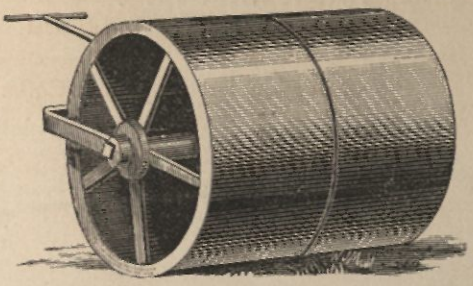
TAPER SHANK.

Diameter of Drills	Length in Inches.	Price Each	Diameter of Drills	Length in Inches	Price Each.
1-4	6 1-8	$ .65	7-8	10 1-2	$2.70
9-32	6 1-4	.70	29-32	10 5-8	2.85
5-16	6 3-8	.75	15-16	10 3-4	3.00
11-32	6 1-2	.80	31-32	10 7-8	3.20
3-8	6 3-4	.85	1	11	3.40
13-32	7	.90	1 1-32	11 1-8	3.60
7-16	7 1-4	.95	1 1-16	11 1-4	3 80
15-32	7 1-2	1.00	1 3-32	11 1-2	4.00
1-2	7 3-4	1.10	1 1-8	11 3-4	4.20
17-32	8	1.20	1 5-32	11 7-8	4.40
9-16	8 1-4	1.30	1 3-16	12	4.60
19-32	8 1-2	1.40	1 7-32	12 1-8	4.80
5-8	8 3-4	1.50	1 1-4	12 1-2	5.00
21-32	9	1.65	1 9-32	14 1-8	5.20
11-16	9 1-4	1.80	1 5-16	14 1-4	5.40
23-32	9 1-2	1.95	1 11-32	14 3-8	5.60
3-4	9 3-4	2.10	1 3-8	14 1-2	5.80
25-32	9 7-8	2 25	1 13-32	14 5-8	6.00
13-16	10	2.40	1 7-16	14 3-4	6.25
27-32	10 1-4	2 55	1 15-32	14 7-8	6.50
			1 1-2	15	6.75

Drills made either Standard or Morse's Taper,

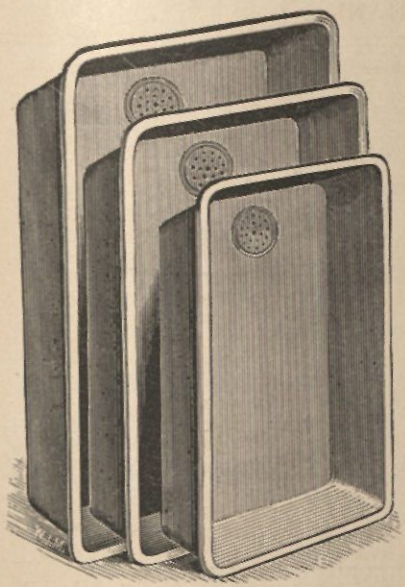
A LIBERAL DISCOUNT ON LARGE ORDERS.

LAWN ROLLERS.



20x20 in two sections,	$23.50
22x22 " "	24.75
24x24 " "	29.75
26x26 " "	36.00
28x28 " "	40.00
30x30 " "	44.00
32x32 " "	57.50
34x34 " "	65.75
36x48 " "	74.75
38x48 " "	95.50
40x48 " "	127.00
42x48 " "	145.00
44x48 " "	166.00
46x48 " "	199.00
48x48 " "	220.00
40x96 in four sections,	300.00

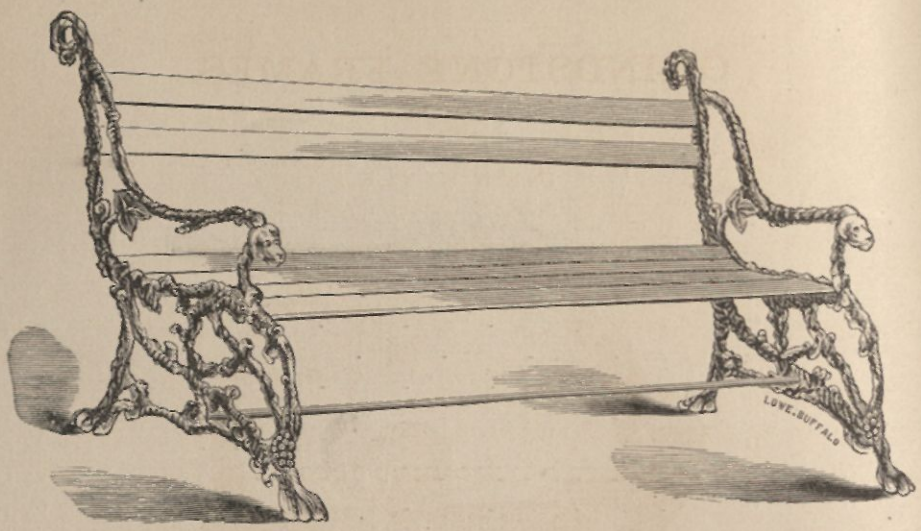
CAST IRON SINKS.



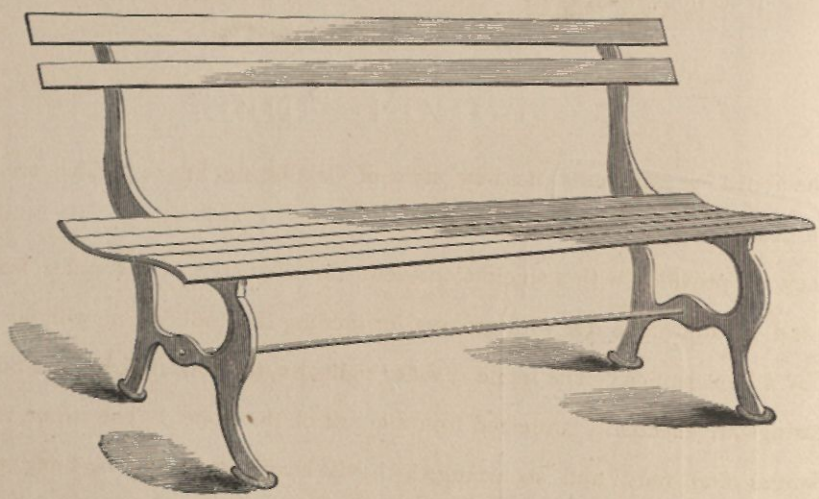
No. 1, 16x26	$325
No. 2, 18x30	400
No. 3, 20x36	500
No. 4, 20x48	850

A LIBERAL DISCOUNT ON LARGE ORDERS.

PARK SETTEE.



No. 1, 4 feet 6 inches long,	$9.00
No. 2, 5 feet 6 inches long,	10.00
No. 3, 7 feet long,	13.00



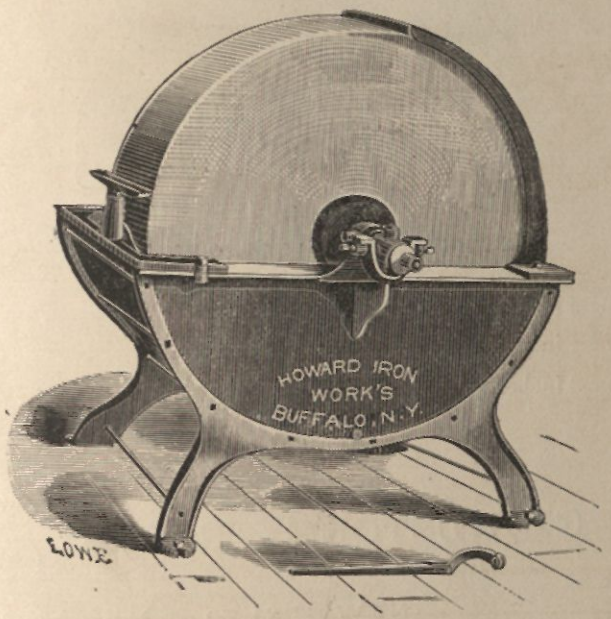
No. 1, 4 feet 6 inches long,	$6.00
No. 2, 5 feet 6 inches long,	7.00
No. 3, 7 feet long,	10.00

Both styles of our Park Settees are constructed with hard wood seats and backs, thereby avoiding the danger of soiling garments from contact with *iron rust.*

We give a liberal discount from above prices, on contracts for furnishing public Parks, or on large orders.

GRINDSTONE FRAMES.

(NEW STYLE.)



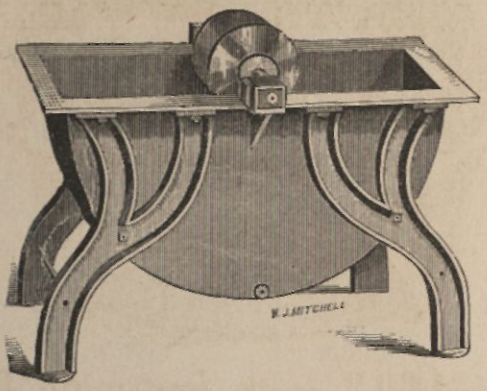
The above cut represents our new style of Grindstone Frames, which are handsome in design and perfect in construction.

They are provided with a shield to prevent the discharge of the water from the stone, and an adjustable rest with grooves for holding the tool, which will be appreciated by all mechanics. The frame is water tight, has the Universal Journal Box, and the bearings are effectually protected from the grit of the stone. The arbor is made with flanges and nuts, and so arranged that a heavy stone can be hung with as little trouble and held as firmly as a saw. They are indispensable in all establishments where Tools are kept in order, and the price places them within the reach of every one.

See List of Prices on next page.

GRINDSTONE FRAMES.

(OLD STYLE.)

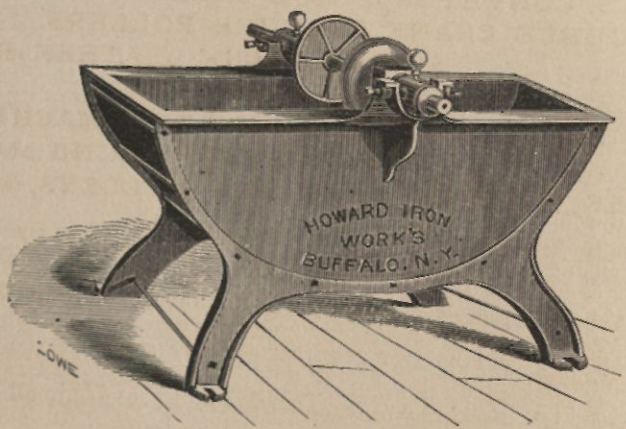


PRICES NOT INCLUDING STONE.

No. 1, Take stone 4 inches face, 30 inches diameter, - - - $30.00
No. 2, Take stone 5 inches face, 42 inches diameter, - - - - 40.00
No. 3, Take stone 8 inches face, 54 inches diameter, - - - 65.00

GRINDSTONE FRAMES.

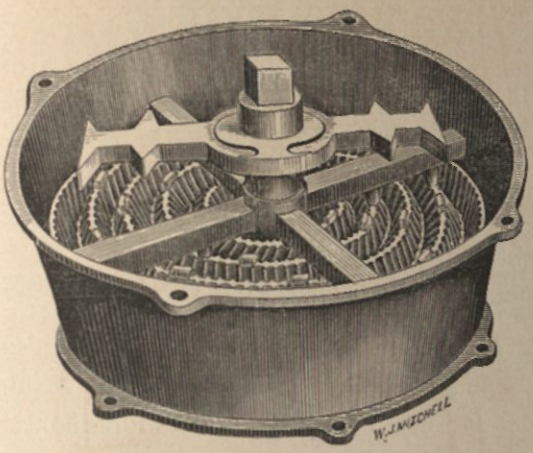
(NEW STYLE.)



PRICES NOT INCLUDING STONE.

No. 4, Take stone 4 inches face, 30 inches diameter, - - - $25.00
No. 5, Take stone 5 inches face, 42 inches diameter, - - - - 35.00
No. 6, Take stone 8 inches face, 54 inches diameter, - - - 50 00

BARK MILLS.



"Howard Mill" with Improved Grinders.

Bark Mill, 6 Grinder,	$40.00
" " 4 "	35.00

SECTIONS OF MILL.

Runners or Nut,	$13.00
Shell or Curb,	20.00
Discharge Bowl,	4.50
Shaft,	5.50
Breaker,	1.50
Cross-bar,	2.50
Coupling,	.50

We desire to call attention to the following articles, which we manufacture:

BARK MILLS, CONVEYERS, HIDE MILLS,
DOUBLE CRANK LEATHER ROLLERS,
SINGLE CRANK LEATHER ROLLERS,
BATE WHEELS, BARK ROSSING MACHINES,
LIQUOR PUMPS, POWER HOISTING MACHINES,
LEATHER WASHING MACHINES,
ENGINES, SHAFTING, HANGERS, PULLEYS, &c., &c.

We respectfully refer to a few of the gentlemen using Tannery Machinery of our make:

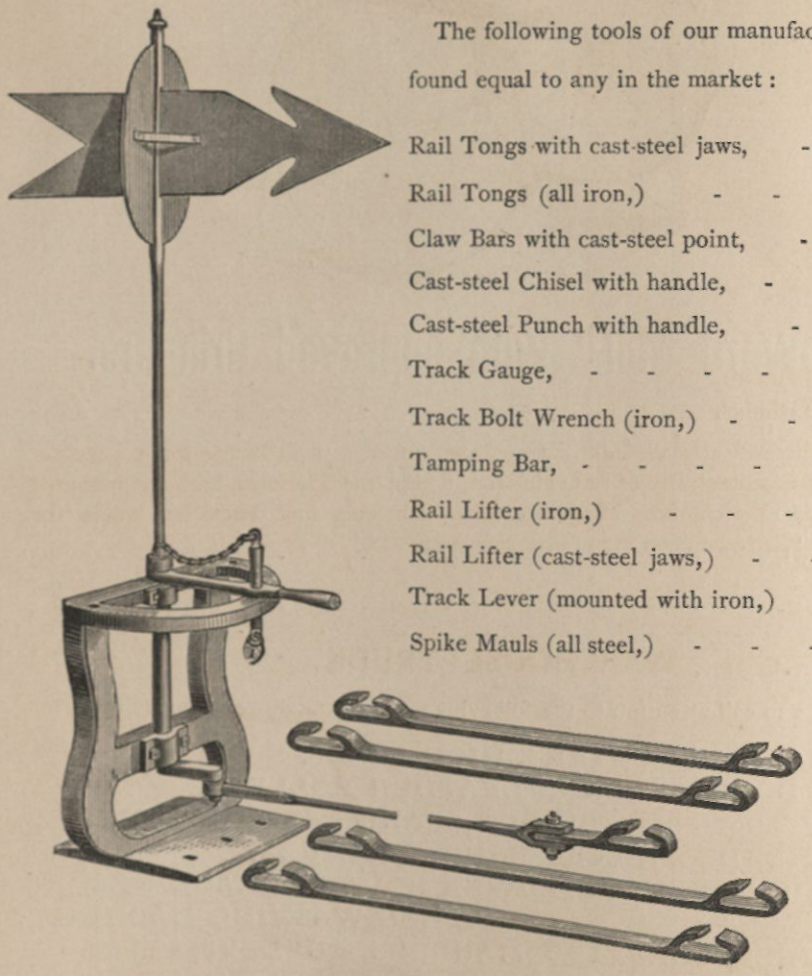
Bush & Howard,	Buffalo, N. Y.
A. Rumsey & Co.,	" "
Jewett & Keating,	" "
C. H. & G. L. Williams	" "
N. H. Gardner & Co.,	Towanda, Pa.
Towanda Tanning Co.,	Rochester, N. Y.
Alling Bros.,	Constancie, N. Y.
Robertson & Bro.,	Rochester, N. Y.
Henry Lampert,	Milwaukee, Wis.
Wisconsin Leather Co.,	Blossburgh, Pa.
Hoyt Bros.,	Chicago, Ills.
C. C. Wallin & Sons,	Buffalo, N. Y.
J. F. Schoellkopf & Son,	

AND MANY OTHERS.

A complete assortment of all Tannery fixtures. Prices and full particulars furnished on application.

RAILWAY SWITCH STANDS.

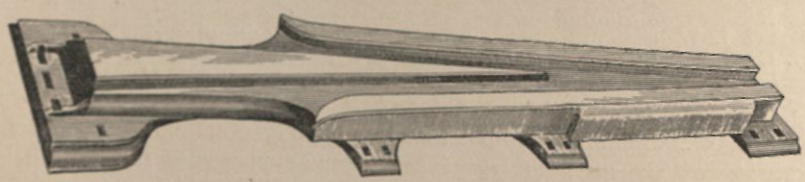
We are prepared to furnish, at short notice, various styles of Switch Stands.



The following tools of our manufacture will be found equal to any in the market :

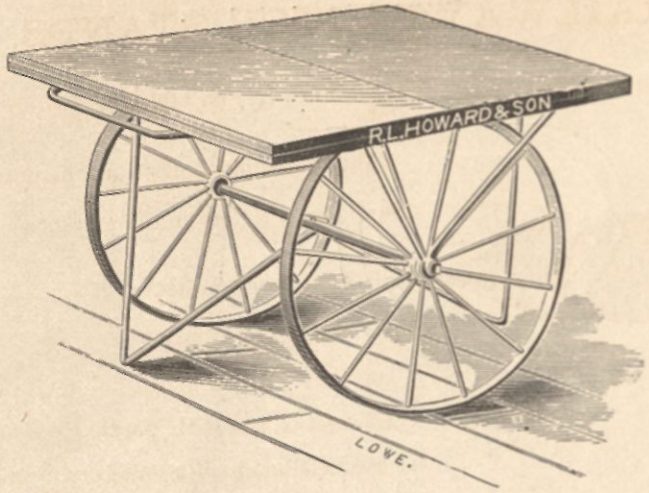
Rail Tongs with cast-steel jaws,	$3.00
Rail Tongs (all iron,)	2.00
Claw Bars with cast-steel point,	5.50
Cast-steel Chisel with handle,	2.00
Cast-steel Punch with handle,	2.00
Track Gauge,	1.75
Track Bolt Wrench (iron,)	1.75
Tamping Bar,	2.00
Rail Lifter (iron,)	2.00
Rail Lifter (cast-steel jaws,)	3.00
Track Lever (mounted with iron,)	4.50
Spike Mauls (all steel,)	4.00

RAILWAY FROGS.



Railway and Crossing Frogs of every required Pattern or Angle.

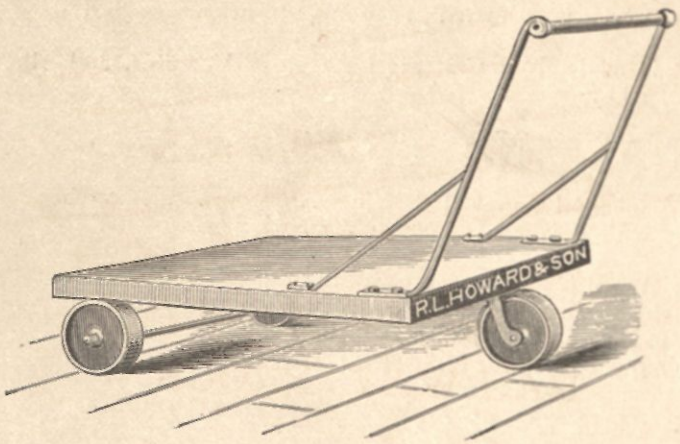
WAREHOUSE CART.



No. 1, 2 feet diameter, - - - - - - - - $25.00
No. 2, 2½ feet diameter, - - - - - - - 30.00

Our Warehouse Carts are light, strong, and run with as little friction as possible. They are constructed entirely of wrought iron, except the Platform, and are intended for use in Paper Warehouses, Mercantile Establishments and Factories, where the goods to be handled comprise more bulk than weight.

WAREHOUSE TRUCK.

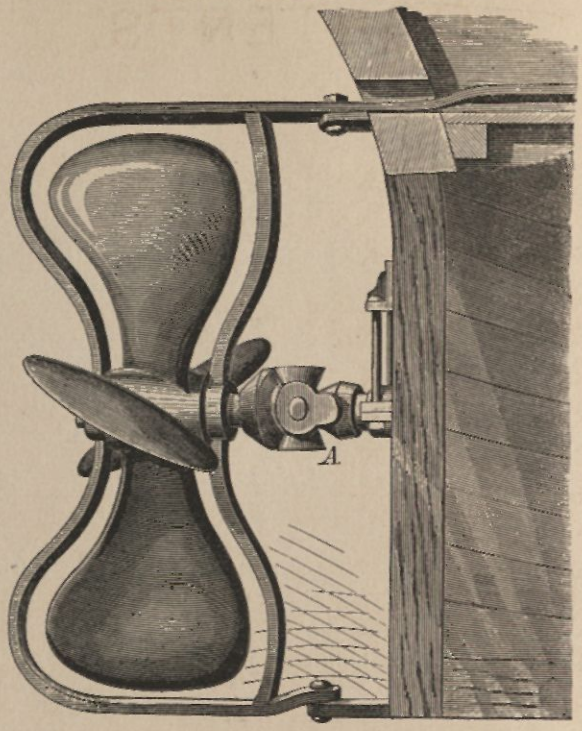


No. 1 - - - - - - - - - $15.00

Our Warehouse Truck is built with three wheels, the third one being attached to a swivel, and can be easily run in any direction, or turned in small space. The wheels and axles are of iron, the Platform strongly braced and supported with iron rods and bolts; it is capable of carrying at least *one ton* in weight, and will be found very useful in connection with Elevators, in receiving merchandise from the dray, transporting it to the Platform of the Elevator, and from thence to any part of the Warehouse, with but one handling of the goods, and the price at which we are enabled to offer them, makes them a desirable acquisition to every Warehouse.

HERCULES SCREW PROPELLER,

Patented Sept. 16th, 1873.



The accompanying cut represents the Hercules Screw Propeller and Rudder Attachment combined, for propelling and steering boats with a Screw Wheel. It does away entirely with the resistance that the rudder offers to the free passage of the water from the Screw, which is estimated as causing a loss of from *eight to ten per cent in the motive power.*

The Joint is made from Cast Steel, strong and durable, and will last for years without change. For

CANAL AND HARBOR NAVIGATION

it furnishes a quick and powerful Steering Apparatus, enabling boats to round the sharpest curves with ease, and *avoiding the frequent dangers of collision* in crowded harbors

The Screw Wheel is furnished separate from the Rudder Attachment when desired, and can be attached to any boat using a Screw. It is composed of either three, four or six blades, (for ordinary uses we regard the four-blade wheel as preferable). *It has been thoroughly tested against the best Screw Wheels in use,* and has never shown less than

TEN PER CENT. MORE POWER

and has shown as high as *twenty per cent.* when tested on the same boat, taking the average of *speed* and power in *towing* and *backing.*

The peculiar curve and shape of the blades cause the water to leave the wheel in a spiral column at the hub, thereby concentrating the entire force of propulsion, and retaining it within the *diameter of the wheel,* for a longer distance than any other Screw now in use.

We claim it to be the most powerful and *economical in the use of fuel,* and guarantee *more speed, more power in towing* and *more power in backing* than can be shown by any other Screw of same size and lead, when tested on same boat with same pressure of steam.

PRICES as low as other first-class wheels. We solicit orders for any size and lead, and furnish them from the best quality of iron, or in steel, as parties may desire.

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HOWARD IRON WORKS.

BUFFALO, N.Y.

MANUFACTURERS OF

SCHLENKER'S BOLT CUTTER,

HOWARD SAFETY ELEVATOR.

HOWARD PARALLEL VISE,

STEEL & IRON SET SCREWS.

SEND FOR PRICE LIST.